BIBLIOGRAPHY OF Technical Reports

December 14, 1951
Vol. 16, No. 6

Contents

Value received from government sponsored research 179
Chemicals and Allied Products 181
Drugs and Pharmaceuticals 181
Dyes 181
Agricultural Chemicals 182
Plastics and Plasticizers 183
Miscellaneous Chemicals 184
Electrical Machinery 184
Communication Equipment 185
Electronics 187
Miscellaneous 188
Food and Kindred Products 188
Fuel and Lubricants 189
Highways and Bridges 190
Instruments 191
Lumber and Wood Products 191
Machinery 193
Medical Research and Practice 195
Metals and Metal Products 201
Minerals and Mineral Products 202
Packing and Packaging 202
Personnel Aptitude Testing 204
Physics 204
General 205
Psychology 207
Rubber and Rubber Products 207
Structural Engineering 208
Textiles and Textile Products 208
Transportation Equipment 208
Aeronautics 208
Aircraft 212
Instruments 214
Engines and Propellers 215
Aerodynamics 216
Land Transportation 216
Marine Transportation 216
Water Supply, Sanitation 216
Miscellaneous 216

NEWSLETTER IN CENTER FOLD

U.S. DEPARTMENT OF COMMERCE
OFFICE OF TECHNICAL SERVICES

NOTE: The Office of Technical Services is responsible, under Presidential order, for aiding in the adequate dissemination of technical reports of benefit to American science and industry. Except to the extent indicated by acknowledgement of authorship, the Office does not edit reports, nor does it accept responsibility for information and opinions contained in them. Patents may cover the subject matter of any report—the reader is advised to make suitable patent searches before developing applications based on the reports.

PROCEDURE FOR ORDERING REPORTS

1. Order by PB report number.
2. Orders for reports in microfilm or photostat type of reproduction listed in the Bibliography of Technical Reports should be addressed to the Library of Congress, Photoduplication Service, Publication Board Project, Washington 25, D. C. Check or money order accompanying orders for microfilm or photostat reports should be made payable to the Librarian of Congress.
3. Orders for reports available in printed form should be addressed to the Department of Commerce, Office of Technical Services, Washington 25, D. C. Check or money order accompanying order for printed reports should be made payable to the Treasurer of the United States.
4. Foreign purchasers of reports, other than Canada and Mexico, should include an additional amount for postage according to the following scale:
   A. Printed reports, mimeograph reports, and photostats: Approximately 4 pages per ounce.
   B. Microfilm: Approximately 50 frames per ounce.

   Rates will vary for different countries. It will be the purchaser's responsibility to compute postage from his country.

This publication is issued by the U. S. Department of Commerce, Office of Technical Services, Washington 25, D. C., on a subscription basis, $5 for 1 year. Foreign subscribers are requested to remit $3 additional for postage. Subscription price of the Newsletter is $0.50 per year.

Published with the approval of the Director of the Bureau of the Budget

---

The reports listed have been received from civil and military agencies of the United States Government and from cooperating foreign governments. Many of the reports cover information captured in enemy countries. Secrecy restrictions on all reports listed have been lifted.

UNITED STATES DEPARTMENT OF COMMERCE

Charles Sawyer, Secretary

OFFICE OF TECHNICAL SERVICES

John C. Green, Director

December 1951

VALUE RECEIVED FROM GOVERNMENT SPONSORED RESEARCH

The U. S. Government is a major factor in research today. As a sponsor of research in many fields, both in its own laboratories and in universities and research foundations, the government aids fundamental studies, sometimes attack industry-wide problems, and supports other investigations deemed to be in the public interest.

Present day research is expensive; it requires teams of highly trained scientists, intricate equipment, and ample time and patience. Certain fields of study are too universal or too fundamental in scope for any one company to support. There are, too, seemingly unrelated fields of study that may have indirect results on the industrial economy. It is in these fields that government research has made accomplishments of value to industry.

The pressing need for fundamental and broad applied research programs has been met in part by letting government contracts to private industry, to universities, and to independent research foundations. From this financial support has come a large store of valuable scientific information, much of which is unclassified and available to industry.

One of the independent organizations performing a certain amount of government research under contract is Armour Research Foundation of Illinois Institute of Technology in Chicago. Although numerically, most Foundation sponsors are industrial concerns or industrial associations, past and present sponsors of government research include the Air Materiel Command, Bureau of Ordnance, U. S. Coast Guard, Signal Corps, Office of Naval Research, and the National Advisory Committee for Aeronautics, and the Department of Commerce.

The scope of government sponsored research at Armour Research Foundation may be broadly categorized as military development, applied projects, fundamental research, and worldwide technological assistance.

Two specific examples of government sponsored projects, one of a rather immediate application and one of long-term significance will best illustrate the kinds of research work carried out by Armour Research Foundation staff members.

In 1947, the American Iron and Steel Institute started a project at Armour to find a suitable domestic substitute for the palm oil used in making hot dip tin plate. Palm oil is all imported from the East Indies and North Africa. World War II resulted in the complete cutting off of the East Indies supply and definite peril to the sole remaining source. None of the steel mills were using in production any material other than palm oil. The AISI sponsored study was begun to provide a domestic substitute for the highly strategic palm oil.

After two years of laboratory work, a special tinning oil made from high grade beef tallow was developed. This material successfully passed full scale production tests in the steel mills. The U. S. Department of Agriculture observed this development with great interest because, just previously, a special appropriation for research on the utilization of low grade animal fats and oils had been approved. Since the American Iron and Steel Institute had completed the tinning oil phase of their project with the development of a successful substitute (specially processed, high grade beef tallow), the Department of Agriculture, with the permission of the AISI, granted funds for continuation of tinning oil research, with emphasis on the utilization of low grade base stocks, so called "greases".

This project has been carried out as a joint venture, with the Eastern Regional Laboratory of the Department of Agriculture processing "greases" to specification for further study by the Foundation. Much basic information has been gained, and soon a production mill test will be run on a large quantity of one of the experimental tinning oils of low grade "grease" base.

A series of related projects on a more fundamental subject, titanium, is of tremendous technological importance. Titanium, actually the fifth most plentiful element in the earth's crust, for a long time was treated as a "rare" metal because of the difficulty of obtaining it in a pure and ductile state. However, its excellent physical properties of high strength-weight ratio, and good corrosion resistance make it an extremely attractive metal for aircraft construction and ordnance application. Research in the extraction metallurgy of titanium was long delayed because of the extreme technical difficulties and the great cost of doing the preliminary work. Finally a group of metallurgists at the Bureau of Mines successfully produced appreciable quantities of ductile titanium. Once sufficient titanium was available to test its physical properties, interest in the metal rose exceedingly. DuPont began extensive experimentation and produced titanium metal on a production scale using the basic process developed by the Bureau of Mines. Other large companies initiated extensive experimentation, and now the bulk of the research on the extraction of titanium from its ores is being carried out by industry, although several government agencies are still active in the field.

In the past the history of the large scale development of a metal has begun with processes for relatively inexpensive extraction, followed by rapidly increasing applications, and then laboratory work on alloying and the fundamental metallurgy of the metal. However, because of the attractive physical properties of titanium and its ultimate potential demand, the government has been able to reverse this procedure. Before the extraction metallurgy is fully worked out and while ultimate applications exist only on paper, a great amount of fundamental work on titanium and its alloys is being sponsored by the U. S. Government. When industry begins to produce low cost titanium metal, we will be able to use it with an extensive technical background already available; government sponsored research is advancing the technology of this metal many years.

Typical projects at the Foundation include basic research on a number of equilibrium diagrams on titanium base alloys, fundamental work that is essential in formulating special purpose alloys. More direct work is being carried out in studies of the heat treatment of titanium alloys, methods of surface hardening titanium, compositions of high temperature heat-resisting alloys, and methods of electroplating titanium.

The handling of titanium is being studied. It has an extremely high melting point (3600°F), and at elevated temperatures it is readily attacked by the oxygen and nitrogen of the air, making a brittle rather than ductile end product. In fact, titanium's affinity for oxygen is so great that it reacts with most refractories. Thus, a current study of refractories which can hold molten titanium without contamination will be of utmost importance if successful. A parallel project is the study of methods of making castings of titanium, using special melting techniques, molding sands, core washes, etc.

These two examples, one an applied development of immediate economic importance and the other of a fundamental nature, are typical of the research projects sponsored at the Foundation and other organizations by government agencies.

W. R. Johnson
Supervisor of Research Information Service

Armour Research Foundation of
Illinois Institute of Technology

CHEMICAL AND ALLIED PRODUCTS

Drugs and Pharmaceuticals

EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS, PART V: COMPARISON OF ADDITIONAL PREPARATIONS IN AIRCRAFT, by Herman I. Chinn, Oliver H. Waltrip and Herbert W. Massengale. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jul 1951. 5p tables Microfilm $1.25, Photostat $1.25. PB 105188

A mixture of 25 mg. of diphenhydramine (Benadryl) and 0.35 mg. of scopolamine hydrobromide was compared during navigation training flights and in routine C-54 flights with the following preparations: chlorcyclizine hydrochloride (Perazil), 50.0 mg.; N-(α-methyl-β-dimethylaminoethyl) phenothiazine hydrochloride (Lergigan), 25.0 mg. mixture of Scopodex, 1.0 mg., and Benadryl, 25.0 mg. All preparations reduced the incidence of nausea and vomiting below the control groups, although the protection afforded by Perazil was not at a statistically significant level. AAF SAM Proj 21-32-014. Report no. 5.

STUDIES ON THE NEWER MEMBERS OF THE B GROUP OF VITAMINS, BY L.C. NORRIS, C.K. CAIN, AND N. S. MOORE. TERMINAL REPORT ON CONTRACT N6ORI-91, TASK ORDER NO. 5, JUNE 1, 1946-JUNE 30, 1949. Cornell University, Ithaca, N. Y. Jun 1949. 8p Microfilm $1.25, Photostat $1.25. PB 105120

1. Vitamin B 2. Vitamins - Research.

VIBRATIONAL SPECTRA AND STRUCTURES OF IODINE PENTAFLUORIDE AND IODINE HEPTAFLUORIDE, by R. C. Lord, M. A. Lynch, Jr., W. C. Schumb and E. J. Slowinski, Jr. Massachusetts Institute of Technology. Spectroscopy Laboratory. Oct 1949. 27p graphs, tables Microfilm $2.00, Photostat $3.75. PB 105033

The Raman spectra of the pentafluoride and heptafluoride of iodine have been studied in the liquid state at room temperature or slightly below. Clear spectra were obtained which permitted a determination of the state of polarization of all but one of the lines due to fundamental vibrations. The infrared absorption spectra of these compounds have been measured in the vapor phase over the spectral range 250-3300 cm^{-1}. The infrared spectra are incomplete in that the spectra of the liquids were not studied, that the spectrum of the pentafluoride was obtained only at relatively low vapor pressures, and that at least two fundamentals lie below the lower limit of the spectrometer. Interpretation of the spectra indicates that the iodine pentafluoride molecule is a tetragonal pyramid (symmetry $C4_v$) with four fluorine atoms at the corners of the square base and the iodine and odd fluorine atoms on the four-fold axis normal to the base. The structure of iodine heptafluoride appears to be that of a pentagonal bipyramid (symmetry D_{5h}). The iodine atom is situated at the center of a regular pentagon formed by five fluorine atoms, the two remaining fluorine atoms being spaced above and below the plane on the five-fold axis through the iodine atom. Technical report no. 3. Contract N5-ori-07810, Project NR-019-103. MIT SP TR 3.

Dyes

15. WISSENSCHAFTLICHE AKO 30.4. 1940 IN FRANKFURT. I. G. Farbenindustrie A. G. Ludwigshafen, Ger. Apr 1940. 134f photos (Text in German) Microfilm $5.50, Enlargement Print $18.75. PB 105192

1. AKO (Kommission für Azofarben) 2. Dyes and dyeing - Manufacture - Germany 3. Dyes, Azo - Manufacture - Germany 4. Dyes, Naphthol AS - Manufacture - Germany 5. Micro BIOS DOCS 2351/2247/1/10-16 6. Micro BIOS FD 310/50, Frames unnumbered 7. Micro BIOS FD 311/50, Frames unnumbered 8. Micro BIOS FD 312/50, Frames unnumbered 9. Micro BIOS FD 313/50, Frames unnumbered 10. Micro BIOS FD 314/50, Frames unnumbered 11. Micro BIOS FD 315/50, Frames unnumbered 12. Micro BIOS FD 510/50, Frames unnumbered 13. Micro BIOS FD 511/50, Frames unnumbered.

Abstract available as PB 105192s. 18p. Microfilm $1.75, Photostat $2.50. Micro BIOS FD numbers do not appear on film. Contents: 1. Arbeiten auf dem azo-gebiet, Ludwigshafen. - 2. Arbeiten auf dem azo-gebiet, Mainkur. - 3. Arbeiten auf dem azo-gebiet, Wissen Hauptlaboratorium, Leverkusen. - 4. Arbeiten auf dem azo-gebiet, Azo Laboratorium, Leverkusen. - 5. Besprechung, ubersichtsreferat, Wolfen. 6. Verzeichniss der referate Höchst. - 7a. Arbeiten auf dem naphthol AS, von Dr. Fischer. 7b. Werk Offenbach.

Agricultural Chemicals

ACTION OF SODIUM HYDRIDE ON ARYL BROMIDES. FINAL AND TECHNICAL REPORT ON NAVY CONTRACT N7-ONR-351, by G. E. Philbrook. Georgia. University, Athens, Ga. Jun 1950. 24p table Microfilm $2.00, Photostat $3.75. PB 105357

This report includes a literature survey through 1944 of the preparation and the physical and chemical properties of NaH. Research to determine the nature and scope of the reactions of NaH and PhBr, p-$C_6H_4HMe_2Br$ (I), o- (II), m- and p-C_6H_4MeBr is summarized. The conditions under which certain aryl halides react with NaH were determined. The yield of NaBr was from 10% for II to about 60% for I. A 2-in. fractionating column packed with 3.5-mm. 1-turn helixes was added to the standard apparatus in the development of a reproducible technique for studying the reactions. II showed a very low reactivity in spite of the presence of the activating Me group. A method was devised for the preparation of 2-Br-1, 4-$C_6H_4Me_2$ (III) and 4-Br-1, 3-$C_6H_4Me_2$ (IV). III and IV were believed to be the purest of the compounds reported; the f.p. was from -16 to -20°C. The data obtained from III and IV indicated that the Me group increases the reactivity of the aryl bromide by a factor of 2.

FUNGUS INHIBITIVE PROPERTIES OF ORGANIC COMPOUNDS. PART II: ALIPHATIC ALCOHOLS, ACIDS, AND ESTERS, by John M. Leonard and Warren E. Weaver. U. S. Naval Research Laboratory. Mar 1949. 17p tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $.50. PB 105296

Using the previously established criterion (the radial growth rate of Aspergillus niger on a nutrient agar containing a known concentration of the toxicant), the evaluation of organic compounds for fungus inhibitive properties is extended to over 200 aliphatic alcohols, acids, and esters. Further correlations between chemical structure (including spatial configuration) and fungistatic activity are attempted. NRL C3403.

Plastics and Plasticizers

EFFECT OF STRESS-SOLVENT CRAZING ON TENSILE STRENGTH OF POLYMETHYL METHACRYLATE, by B. M. Axilrod and Martha A. Sherman. U. S. National Advisory Committee for Aeronautics. Aug 1951. 19p photos, tables Microfilm $1.75, Photostat $2.50. PB 104971

Loss of strength of tensile specimens of polymethyl methacrylate by stress-solvent crazing at 23°C and 50-percent relative humidity was investigated. Sheet-to-sheet variability of crazed and control specimens, effect of masking paper on crazing, and relative effect of a few large crazing cracks as compared with more numerous fine cracks were studied. Because it was impossible to predict tensile strength of crazed specimens from their appearance, it is suggested that aircraft enclosures with crazing of the type described in this work should be removed if, in service, tensile stress occurs normal to the crazing cracks. NACA TN 2444.

FLAME AND HEAT RESINS FOR NAVAL CONSTRUCTION: FINAL REPORT UNDER RESEARCH CONTRACT N8-ONR-504, TASK ORDER #1, NR033-248, by R. S. Doddsworth, H. W. Robinson, E. S. Ebers, W. F. Brucksch, Jr. United States Rubber Company. Naugatuck Chemical Division, Naugatuck, Conn. Feb 1949. 12p graphs, tables Microfilm $1.75, Photostat $2.50. PB 105064

The general order of magnitude of the thermal stabilities of some commercial and numerous experimental laminating resins was measured. The most extensive investigations were concerned with the behavior of chemical structures and groups, chiefly carbon based, as derived from low-pressure curing polyester resin systems. Other polymer structures and intermediates were examined, however, for potential heat-stable materials. A few experiments were directed at the physical aspects of heat degradation and emphasized the importance of oxygen in this process. Flame resistance tests were performed on representative resin laminates. In addition, ignition measurements were made to examine the flame retarding influence of some substituent chemical groups and atoms which could be attached to basic polymer networks. This report summarizes the work done during the contract period, January 15, 1948 to January 15, 1949.

FLOW PROPERTIES OF PLASTICS, by Stephen A. Rossmassler and Henry Eyring. Utah. University, Salt Lake City, Utah. 1949. 19p diagr, graphs, tables Microfilm $1.75, Photostat $2.50. PB 105018

A sinusoidal rate of loading is one of the less common ways of testing fibers. A mathematical treatment of the behavior of visco-elastic materials under such conditions is developed, and this theory is applied to data obtained using Nylon 66 monofils. The results indicate that the significant values for the flow process are dependent on the frequency of the vibration. An experimental method for obtaining the data necessary is described. Contract N7onr-45101, Project number NR-032-168. Technical report no. VIII. Paper presented before the High Polymer Symposium of the American Chemical Society Meeting at San Francisco, April 1949.

PREPARATION OF MONOFUNCTIONAL, HOMOGENEOUS SULFONIC ACID CATION EXCHANGE RESINS. ION EXCHANGE PROJECT, CONTRACT N6-ONR-263, TASK ORDER IV, PROJECT ONR-057-089, SUBMITTED by D.E. Bladwin, C.G. Overberger, and H. P. Gregor. Polytechnic Institute of Brooklyn. Mar 1949. 59p Microfilm $2.75, Photostat $7.50. PB 105014

The purpose of this work was to prepare a pure, monofunctional, homogeneous sulfonic acid cation exchange resin, whose elastic properties can be varied. This material was desired for certain theoretical investigations. After preliminary work it was decided to attempt to prepare a polymer of vinylsulfonic acid with a suitable cross-linking agent. Divinylbenzene was found to be unsatisfactory as a co-monomer either with the acid or with its esters. Vinylsulfonic acid was found to polymerize with difficulty in non-ionizing solvents but more readily in aqueous solution. Salts of vinylsulfonic acid polymerized readily in aqueous solution to high molecular weight polymers. Vinylsulfonic esters could not be polymerized by standard techniques. They copolymerized well with vinyl acetate and vinyl chloride but poorly with styrene and divinylbenzene. A hitherto unreported reaction leading to a thermosetting resin was observed with butyl vinyl ether. In no case was vinylsulfonic derivative observed to polymerize or co-polymerize under acid catalysis. It was concluded that the failure of unionized vinylsulfonic derivatives to polymerize well is due to the strong polarization of the vinyl group by the sulfonate group, and that the vinylsulfonics are unreactive monomers, comparable to vinyl acetate and vinyl chloride. This implies that resonance through the sulfonate group contributes little to the state of the molecule.

SHAKE-DOWN IN CONTINUOUS MEDIA, by P. S. Symonds. Brown University. Graduate Division of Applied Mathematics, Providence, R. I. Aug 1949. 27p diagr Microfilm $2.00, Photostat $3.75. PB 105011

A new and simpler proof is given for a theorem due to Melan concerning the conditions under which an elastic-plastic body will "shake down", i. e. reach a residual stress state on which only elastic stresses are superimposed for all further variations of the surface loading stresses within limits prescribed at surface points. The theorem is applied to discuss the case of a circular bar subject to an axial force and a torsional moment which vary independently between given limits. Relations to previous work on trusses and rigid frames are briefly discussed. Technical report no. 38. A11-38/21. Contract N7 onr-358 T. O. I, NR-041-032. See also PB 106010.

Miscellaneous Chemicals

ANNOTATED BIBLIOGRAPHY ON THE PREPARATION OF CHLORAL AND CHLORAL HYDRATE, by W. Stephen Crawford, Alexander Cruickshank, Albert B. Nelson, Robert S. Yare. Work coordinated by W. George Parks and J. Katz. Rhode Island State College, Kingston, R. I. Jul 1944. 12p Microfilm $1.75, Photostat $2.50. PB 105107

1. Chloral - Preparation - Bibliography 2. Chloral hydrate - Preparation - Bibliography.
Contract WPB-185. Chloral report 44-1.

ANNOTATED REFERENCES FOR THE ASSAY OF CHLORAL AND CHLORAL HYDRATE, by T. Stephen Crawford, Alexander Cruickshank, Albert B. Nelson, Robert S. Yare. Work coordinated by W. George Parks and J. Katz. Rhode Island State College, Kingston, R.I. Jul 1944. 4p Microfilm $1.25, Photostat $1.25. PB 105108

1. Chloral - Determination - Bibliography 2. Chloral hydrate - Determination - Bibliography.
Contract WPB-185. Chloral report 44-2.

CATALYTIC CHLORINATION OF 95% BY VOLUME ETHYL ALCOHOL. FERRIC CHLORIDE, by Albert B. Nelson, Alexander Cruickshank, Robert S. Yare. Work coordinated by W. George Parks, T. Stephen Crawford, J. Katz. Rhode Island State College, Kingston, R. I. Oct 1944. 3p Microfilm $1.25, Photostat $1.25. PB 105116

The yield of chloral was adversely affected by the use of a ferric chloride catalyst. WPB Contract no. 185. Chloral report 44-10.

CHLORINATION OF ETHYL ALCOHOL, by T. Stephen Crawford, Albert B. Nelson, Alexander Cruickshank, Robert S. Yare. Work coordinated by W. George Parks and J. Katz. Rhode Island State College, Kingston, R.I. Jul 1944. 8p drawing, table Microfilm $1.25, Photostat $1.25. PB 105109

The chlorination of 95% Ethyl Alcohol and Absolute Ethyl Alcohol at various temperatures has been studied with the result that a new procedure for the industrial preparation of chloral has been developed. Contract WPB-185. Chloral report 44-3.

CHLORINATION OF ETHYL ALCOHOL-WATER SOLUTIONS. I: CHLORAL. II: UNREACTED CHLORINE IN THE EXIT GASES. III: ETHYL CHLORIDE. WORK COORDINATED by W. George Parks, T. Stephen Crawford, J. Katz. Collaborators: Albert B. Nelson, Alexander Cruickshank, Robert S. Yare. Rhode Island State College, Kingston, R. I. Sep 1944. 16p graphs, tables Microfilm $1.75, Photostat $2.50. PB 105113

Solutions of ethyl alcohol and water containing from 0 to 35% water by weight have been chlorinated to determine the effect of the alcohol concentration on the yield of chloral. Contract WPB-185. Chloral reports 44-7-I, II and III.

CHLORINATION OF 95% BY VOLUME ETHYL ALCOHOL: PHYSICAL DATA, by Albert B. Nelson, Alexander Cruickshank, Robert S. Yare, Work coordinated by George Parks, T. Stephen Crawford, J. Katz. Rhode Island State College, Kingston, R. I. Nov 1944. 6p diagrs, fold table Microfilm $1.25, Photostat $1.25. PB 105117

The physical constants of chlorinated 95% by volume ethyl alcohol obtained from samples with a chlorine input of 0.5, 1.0, 1.5, 2.0 and 2.5 mols per mol of ethyl alcohol in the preparation of chloral have been investigated. WPB Contract no. 185. Chloral report 44-11.

CHLORINATION OF 95% ETHYL ALCOHOL I: THE UNREACTED CHLORINE IN THE EXIT GASES, by Albert B. Nelson, Alexander Cruickshank, Robert S. Yare. Work coordinated by W. George Parks, T. Stephen Crawford, J. Katz. Rhode Island State College, Kingston, R. I. Aug 1944. 4p graph, table Microfilm $1.25, Photostat $1.25. PB 105111

At the stated space velocities, approximately 6-8% of the total chlorine input passes through the system unreacted. Contract WPB-185. Chloral report 44-5.

CHLORINATION OF 95% ETHYL ALCOHOL. II: THE FORMATION OF ETHYL CHLORIDE, by Albert B. Nelson, Alexander Cruickshank, Robert S. Yare. Work coordinated by W. George Parks, T. Stephen Crawford, J. Katz. Rhode Island State College, Kingston, R. I. Aug 1944. 5p graphs, table Microfilm $1.25, Photostat $1.25. PB 105112

The quantity of ethyl chloride in the exit gases has been determined and its formation investigated. Calculation of space velocity. Contract WPB-185. Chloral report 44-6.

FUSED IRON CATALYSTS FOR THE CO-H_2 SYNTHESIS, by Dr. Klemm. U. S. Field Information Agency, Technical. Jun 1948. 39p Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $1.00. PB 97368s

1. Catalysts, Iron 2. FIAT FR 1267 supplement.
Supplement to PB 97368.

HYDROLYSIS OF SOME ALKYL LACTATES. II: "NEUTRAL" AND ACID HYDROLYSES, BY A. A. COLON, KENNETH H. VOGEL AND J. C. WARNER. TECHNICAL REPORT NO. 2 UNDER CONTRACT N8 ONR-78900, PROJECT NO. NR056185, UNDER THE DIRECTION OF J. C. WARNER. Carnegie Institute of Technology. Aug 1950. 8p tables Microfilm $1.25, Photostat $1.25. PB 105352

The kinetics of alkaline, neutral, and acid hydrolyses were investigated for Me, Et, n-Pr, n-Bu, iso-Bu, sec-Bu, tert-Bu, 2-methoxyethyl, and 2-chloroethyl lactates. Boiling points, refractive indexes, and saponification equivalents were determined. Second-order rate constants were evaluated from the slopes of (a) reciprocal concentration vs. t, (b) log $\left[(a^{1/2} + x^{1/2})/(a^{1/2} - x^{1/2})\right]$ vs. t, and (c) log $\left[1/(a - x)\right]$ vs. t for alkaline, neutral, and acid hydrolyses, respectively, where a is the initial concentration of lactate and x the concentration at time t.

Activation energies (Ea) were essentially constant at about 10,600, 16,200, and 14,300 cal. for alkaline, neutral, and acid hydrolyses, respectively; frequency factors (PZ) varied consistently except those for iso-Bu and tert-Bu lactate in alkaline and acid hydrolyses, respectively. Alkaline and acid hydrolyses followed second- and pseudo first-order kinetics, respectively, conforming to the Day-Ingold mechanism of bimolecular acyl-O fission (Trans. Faraday Soc. 37:686, 1941); neutral hydrolysis was apparently a composite OH_3^+ catalyzed reaction. The rate constant increased for Me branching in the β position and decreased for branching in the α position. Abstracted from theses submitted by A. A. Colon and K. H. Vogel.

IMPROVED METHOD FOR THE PRODUCTION OF CHLORAL FROM ETHYL ALCOHOL, by Albert B. Nelson, Alexander Cruickshank, Robert S. Yare. Work coordinated by W. George Parks, T. Stephen Crawford, and J. Katz. Rhode Island State College, Kingston, R. I. 1944. 3p Microfilm $1.25, Photostat $1.25. PB 105110

Ninety-five per cent ethyl alcohol can be chlorinated to form chloral in 85% yield. The laboratory procedure and apparatus used in this investigation suggests an inexpensive commercial method of manufacture. Contract WPB-185. Chloral report 44-4.

PHOTOCHEMICAL CHLORINATION OF 95% BY VOLUME ETHYL ALCOHOL, by Albert B. Nelson, Alexander Cruickshank, Robert S. Yare. Work coordinated by W. George Parks, T. Stephen Crawford, J. Katz. PB 105115

The light emitted from a 200 watt clear glass tungsten filament lamp placed approximately six inches from the reaction cylinder was detrimental to the chlorination of ethyl alcohol. WPB Contract no. 185. Chloral report 44-9.

PRODUCTION OF CHLORAL: PILOT PLANT INVESTIGATION. WORK COORDINATED by W. George Parks, T. Stephen Crawford, Jacob Katz, assisted by Albert B. Nelson, Alexander Cruickshank, Robert S. Yare. Rhode Island State College, Kingston, R. I. Nov 1944. 5p table Microfilm $1.25, Photostat $1.25. PB 105118

The production of chloral by the improved process was investigated in a 20 gallon, glass-lined, jacketed kettle. The results demonstrated that, ordinary industrial equipment such as tanks, kettles, stills, etc. are not satisfactory for best results by the improved process. WPB Contract no. 185. Chloral report 44-12.

PROPERTIES OF SOLUTIONS IN THE NEIGHBORHOOD OF THE CRITICAL TEMPERATURE OF THE SOLVENT. FIRST TECHNICAL REPORT, PHYSICAL SCIENCES DIVISION, CONTRACT N6ONR-238-11 (FORMERLY N8ONR-67800) PROJECT NO. NR058-146, PERIOD FEB 1, 1949-MAR 31, 1950, by Sidney W. Benson, Charles S. Copeland and others. University of Southern California. Dept. of Chemistry, Los Angeles, Calif. May 1950. 85p photos, drawings, diagrs, graphs, tables Microfilm $3.75, Photostat $11.25. PB 105257

Behavior studies of supercritical solutions of $CoCl_2$ in H_2O, MeOH, acetone, and CCl_4 disclosed the existence of critical solution phenomena for all but the last solvent. Quantitative investigations concerning phase equilibria of the supercritical $NaCl$-H_2O system provided sufficient data to permit construction of phase diagrams. The phase diagrams showed (1) a state of equilibrium between the vapor phase and solid NaCl at low salt concentrations, (2) retrograde condensation with the vapor phase in equilibrium with the unsaturated liquid phase at high salt concentrations, and (3) equilibrium of the 3-phase system, with a dilute vapor phase, up to relatively high temperatures. An apparatus was developed which measures dielectric constants, conductivities, and pressures of liquid and vapor systems to 450°C and 5000 p.s.i. Preliminary results concerning the behavior of LiBr in acetone, KI in MeOH, and pure H_2O indicated higher conductivities for vapor solutions over the pure solvents in the first 2 systems and conductivity dependent upon concentration of the vapor rather than temperature for pure H_2O. On cover: Final report.

THREE STAGE CHLORINATION OF ETHYL ALCOHOL. I. PREPARATION OF CHLORAL, by Albert B. Nelson, Alexander Cruickshank, Robert S. Yare. Work coordinated by W. George Parks, T. Stephen Crawford, J. Katz. Rhode Island State College, Kingston, R. I. Oct 1944. 4p Microfilm $1.25, Photostat $1.25. PB 105114

Absolute ethyl alcohol was progressively chlorinated at three temperature levels and the results compared with the chlorination at reflux temperature. WPB Contract no. 185. Chloral report 44-8.

ELECTRICAL MACHINERY, EQUIPMENT AND SUPPLIES

Communication Equipment

BIBLIOGRAPHY OF RADIO ASTRONOMY, by Martha Elizabeth Stahr. Cornell University. School of Electrical Engineering, Ithaca, N. Y. Dec 1948. 49p Microfilm $2.50, Photostat $6.25. PB 105091

This report consists of an annotated list of references pertaining wholly or in part to that phase of radio astronomy which deals with radio-frequency radiations from extraterrestrial sources. The related fields of radio studies of meteors and auroras have been excluded, the geophysical aspects of their techniques and present aims suggesting the desirability of separate bibliographies. For convenience the present bibliography has been subdivided into the following six sections: 1. Observations of galactic noise. 2. Observations of solar noise. 3. Theory of the emission of radio waves by the galaxy. 4. Theory of the emission of radio waves by the sun. 5. Theory and description of instruments. 6. Reviews. The articles in each section are arranged according to year of publication; within each year they are placed alphabetically by author, or by title if no author is given. The number assigned each reference designates the section to which it belongs as well as its location within that section. An author index of the entire bibliography is given on the final pages. Radio astronomy report no. 2. Contract N6 onr-264, T.O. no. 6, NR077-321.

BILINEAR TRANSFORMATIONS APPLIED TO THE TUNING OF THE FINAL STAGE OF A TRANSMITTER, by K. S. Kunz. Harvard University, Cruft Laboratory. Sep 1948. 30p diagrs Microfilm $2.00, Photostat $3.75. PB 105074

The proper tuning of a Class C amplifier inductively coupled to load and having tuning capacitors in both primary and secondary circuits has not previously been determined, because of the complexity of the mathematics involved. For this reason, much confusion has arisen as to the relation between the following three conditions: a. resonance of the secondary; b. maximum-minimum point of average plate current c. maximum coupled circuit efficiency. In this paper we have employed the powerful theory of bilinear transformations in a complex plane, for which circles are transformed into circles, to determine the actual value of the secondary capacitance for a maximum-minimum of average plate current and for maximum coupled circuit efficiency. The results of this investigation show that b. and c. differ widely from a. - except for the case of series load in the secondary circuit. Moreover, b. may differ considerably from c.; however, these two conditions are indistinguishable if the Q of the primary coil is large and the coefficient of coupling small. Contract N5-ori-76, T. O. I. HU CL TR 59.

CONSTRUCTION AND CHARACTERISTICS OF A NON-CONTACT ELECTROMAGNETIC RECORDING AND REPRODUCING HEAD, by G. Ward Lund. Engineering Research Associates, Inc., St. Paul, Minn. Aug 1950. 30p photos, graphs Microfilm $2.00, Photostat $3.75. PB 101986

1. Recorders, Sound - Magnetic.

Contract NObsr-42001.

LIFEBOAT HIGH-FREQUENCY RADIO COMMUNICATIONS EQUIPMENT. RADIO TRANSMITTING AND RECEIVING EQUIPMENT, MODEL T-104 TRANSMITTER, TYPE R-104 RECEIVER, FREQUENCY RANGE 2000-4500 KILOCYCLES, MANUFACTURED FOR U.S. COAST GUARD. INSTRUCTIONS. RCA Manufacturing Co., Inc., Camden, N. J. Sep 1938. 49p photos, diagrs, graph, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $1.25. PB 104774

1. T-104 (Radio transmitter) 2. R-104 (Radio receiver) 3. Lifeboats - Radio equipment.

Contract TCG-29287. Photographic reproduction of pt. II of the station equipment instruction book together with the drawings which apply to lifeboat equipment.

MINUTES OF THE CONFERENCE ON AVIATION COMMUNICATION SYSTEMS, THE PENTAGON, WASHINGTON, D. C., JUNE 7, 1951, CALLED BY DR. H. A. IMUS AT THE REQUEST OF RADM. W. K. HARRILL. Conference on Aviation Communication Systems, Washington, D. C., 1951. Jun 1951. 23p Microfilm $2.00, Photostat $3.75. PB 105179

1. Communication systems, Audio.

TRAINING BY TELEVISION, A STUDY IN LEARNING AND RETENTION, CONDUCTED UNDER CONTRACT N-7 ONR 47602, by Robert T. Rock, Jr., James S, Duva, John E. Murray. Fordham University. Dept. of Psychology, New York, N. Y. n.d. 24p photos, maps, graphs Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.75. PB 105493

1. Television 2. Training devices - Evaluation 3. Training films, Audio-visual 4. SDC 476-02-3 5. NAVEXOS P-850-3.

Human Engineering project 20-E-5a (Rapid mass learning).

Electronics

AMPLIFICATION CHARACTERISTICS OF TRAVELING-WAVE TUBES. PROJECT SUPERVISOR, W. W. Harman. Staff: J. L. Putz, J. H. Tillotson, E. M. T. Jones, H. W. Smith, F. Y. Sze. Stanford University. Electronics Research Laboratory, Stanford, Calif. May 1949. 24p graphs Microfilm $2.00, Photostat $3.75. PB 105027

This memorandum presents a reasonably complete experimental evaluation of the influence on the gain of a helix type traveling-wave tube of beam current, helix length, beam voltage (or helix pitch), signal level, and oscillation suppression devices. A thorough study of the amplifying properties of traveling-wave tubes has been felt to be a prerequisite to intelligent work on oscillator applications of these tubes. The chief objectives have been to determine under what conditions the simple small-signal (linear) analysis adequately describes the tube action, and to empirically determine the amplification characteristics under other conditions. Technical memorandum no. TM 101. Contract N6-ONR-251, Task order no. 7 (NR-078-360).

EXPERIMENTAL OBSERVATION OF DOUBLE-STREAM AMPLIFICATION, PRELIMINARY NOTES, by Bertil N. Agdur. Chalmers University of Technology, Gothenburg, Sweden. 1951. 12p photos, drawing, graphs Microfilm $1.75, Photostat $2.50. PB 104703

1. Electrons - Waves - Sweden 2. Electrons - Beams - Sweden 3. Amplifiers, Magnetic - Sweden.

Transactions of Chalmers University of Technology nr. 105. Reports from the Research Laboratory of Electronics no. 18.

MICROWAVE PROPAGATION IN THE OPTICAL RANGE, by Olof F. Perers, Bo K. E. Stjernberg and Sven K. H. Forsgren. Chalmers University of Technology, Gothenburg, Sweden. 1951. 21p photos, map, graphs Microfilm $2.00, Photostat $3.75. PB 104706

1. Radio waves - Propagation - Sweden 2. Radio waves - Propagation - Sweden.

Transactions of Chalmers University of Technology nr. 108. Reports from the Research Laboratory of Electronics, no. 21.

ORGAN PIPE SCANNER, by K. S. Kelleher and H. H. Hibbs. U. S. Naval Research Laboratory. Aug 1951. 17p photos, diagrs, graphs Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.50. PB 104955

For many scanning problems, it is desirable to move a feed horn along some curve on the focal surface of an objective. Since this method of scanning is

mechanically difficult, a simpler mechanical motion accompained by a transformation to an apparent motion along the required curve is desirable. A scanner has been constructed with fixed waveguide channels performing the transition between a rotation and linear motion. A horn on the circle feeds several channels which radiate from their position on the line. When the horn is rotated to feed a different set of channels, these radiate from a different position on the line; consequently, when this structure feeds an objective, scanning is obtained. Although not elaborately constructed, this scanner gives good primary and secondary patterns, has good pattern continuity with horn rotation, is well matched, and has not broken down under reasonably high power. NRL R 3842.

PROGRESS REPORT NO. 14 COVERING PERIOD OCT 1, 1949-JAN 1, 1950 UNDER CONTRACT N5-ORI-76. TASK ORDER I, NR-078-011 SUBMITTED BY E. L. CHAFFEE; TASK ORDER 28, NR-071-011 SUBMITTED BY H. R. MIMNO. Harvard University. Cruft Laboratory. Jan 1950. 121p photos, diagrs, graphs Microfilm $5.00, Photostat $16.25. PB 105255

Progress is reported on electromagnetic radiation, wave propagation, microwave circuits, physical electronics, and theoretical topics. Abstracts are included of technical reports completed since 1 Oct. 1949. Technical reports and memoranda are listed.

RADUX, by J. A. Pierce. Harvard University. Cruft Laboratory. Jul 1947. 18p diagrs, graphs Microfilm $1.75, Photostat $2.50. PB 105121

This report is a brief disclosure of a proposal for a new very long range hyperbolic radio aid to navigation called Radux. The techniques appear to be direct and the equipment should be easy to develop. Transmitting stations would be complex but automatic in operation and few in number. The navigators' receiver-indicators would be simple and completely automatic, thus leading directly to automatic course tracing and steering. It appears that the reliable range of the new system, even in the presence of tropical static, should approach 3000 miles, if the optimum carrier frequency is used. The average errors to be expected can be predicted and should not exceed five miles at distances up to at least 2000 miles. The errors at short distances, however, will not be less than one or two miles. Radux is accordingly a system giving fairly constant accuracy over large areas. It would, like any other long-range system, require the use of precomputed charts or tables, but would not call for any computations on the part of the navigator. The expected useful range is double that of any existing system and the accuracy at 2000 miles or more should exceed the accuracy of Low Frequency Loran at a third of the distance. Contract N5-ori-76, Task order no. I. HU CL TR 17.

SIGNAL SAMPLER AND SYNTHESIZER, by Walter Otto. U. S. Air Materiel Command. Engineering Division. Aircraft Radiation Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Sep 1950. 21p photos, diagrs (part fold) Microfilm $2.00, Photostat $3.75. PB 105244

A circuit has been developed for sampling the wave shape of a recurrent video signal, and synthesizing the samples into a similar wave shape having a low recurrence frequency. Synthesis may be accomplished at any convenient integral or nonintegral submultiple of the recurrence frequency. A video signal is sampled at a rate equal to the ratio between the video recurrence frequency and the desired recurrent rate of the wave shape; the samples are reassembled at the latter rate. Essentially, this operation results in frequency division, all the frequency components of the video signal being divided by a factor equal to the aforementioned ratio. A further significant reduction in the bandwidth required to transmit the video data is feasible, since useless high modulation frequency components of the sampled and synthesized signal may be discarded. The highest frequency component which need be considered is in the order of the radar's repetition frequency. The method and techniques involved in this method of synthesis may have general applications to problems involving the direct relaying of "video" information over a narrow bandwidth. AAF TR 6253.

SOME CALCULATIONS OF RAY PATHS IN THE IONOSPHERE, by Sven K. H. Forsgren. Chalmers University of Technology, Gothenburg, Sweden. 1951. 24p diagrs, graphs Microfilm $2.00, Photostat $3.75. PB 104702

1. Electrons - Waves - Sweden 2. Ray tracing - Sweden 3. Ionosphere - Research - Sweden.

Transactions of Chalmers University of Technology nr. 104. Reports from the Research Laboratory of Electronics no. 17.

STRAIGHT LINE ANALYSIS OF FULL-WAVE MAGNETIC AMPLIFIER, by Walter Esselman. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N. Y. Sep 1949. 32p diagrs, graphs Microfilm $2.25, Photostat $5.00. PB 105082

A linear analysis, based on the approximation of the magnetization curve by three straight lines, is applied to the full-wave magnetic amplifier circuit, and a comparatively simple method of computing the steady-state wave shape of the load current is described. Values of load current, computed for a particular full-wave amplifier, are found to be in good agreement with corresponding experimental values. Report R-223-49, PIB-168. Contract N6 ori-98, Task order IV, Project designation NR-075-214.

STUDY OF SELF-SATURATING MAGNETIC AMPLIFIERS. PART II: INVESTIGATION OF RECTIFIER REVERSE CURRENT FLOW, AND STEADY STATE ANALYSIS OF FULL-WAVE AND DOUBLER CIRCUITS, by Edward J. Smith. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N. Y. Feb 1950. 38p photos, diagrs, graphs Microfilm $2.25, Photostat $5.00. PB 105123

Differences in performances of the Half-Wave, Full-Wave, and Doubler types of self-saturating magnetic amplifier circuits, under conditions of constrained control circuit magnetization, are primarily due to rectifier leakage or reverse current flow effects. The most important effect of rectifier leakage is demagnetization of the core and its consequent modification of the circuit transfer curves from the

ideal reference curve in which no leakage exists. Simple methods for evaluating rectifier leakage effects in the three basic self-saturating circuits are derived. Steady state response curves are computed for the three circuit types by correcting the "ideal" curve of the Half-Wave Circuit for these leakage effects. Computed results show reasonable agreement with test results for Hypersil and Orthonik Amplifiers. Contract N6ori-98, Task order IV, NR075-214. Report R230-50, PIB-175.

THREE-CHANNEL ELECTRONIC SWITCH, by R. L. Westby. National Research Council of Canada. Radio and Electrical Engineering Division. Jul 1951. 13p photos, fold diagr, graph Available from National Research Council of Canada, Ottawa, Canada $.15. PB 105052

Three different transient audio frequencies, ranging up to 1,500 cycles per second, can be displayed simultaneously on a single beam oscilloscope. A linear sweep is applied to the cathode-ray tube and is displaced in turn to three adjustable levels, 7,500 times a second, thus effectively producing three linear sweeps. The audio inputs are sampled in sequence at the same rate so that a given audio signal appears on one trace only. Circuit diagrams and sample photographs of the cathode-ray tube presentation are included. NRCC ERA-201. NRCC 2426.

TRANSFORMATION OF THE ELASTIC, PIEZOELECTRIC, AND DIELECTRIC COEFFICIENTS OF CRYSTALS, by B. J. Faraday and B. D. Simmons. U. S. Naval Research Laboratory. Aug 1951. 26p tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $.75. PB 105302

Transformation equations for obtaining the elastic, piezoelectric, and dielectric coefficients of a crystal in a rectangular coordinate system rotated with respect to the crystallographic axes are derived. The case of a general rotation about all three of the axes, and the special case of a rotation about a single axis, are treated to conform to the IRE Standards on Piezoelectric Crystals, December 1949. NRL R 3857.

VARIATIONAL SOLUTION TO THE PROBLEM OF THE SYMMETRICAL CYLINDRICAL ANTENNA, by James E. Storer. Harvard University. Cruft Laboratory. Feb 1950. 50p diagrs, graphs, tables Microfilm $2.50, Photostat $6.25. PB 105095

The problem of radiation from a thin wire antenna is cast in a variational form. The input impedance is used as the stationary parameter and the current along the antenna as the wave function. Using a suitable trial function an approximate solution for the case of a symmetrical cylindrical antenna is determined. This solution is shown to be in good agreement with the one obtained by King and Middleton for the same problem. Contract N5ori-76, Task order I, NR 078-011. HU CL TR 101.

Miscellaneous

HIGH INTENSITY SHORT DURATION SPARK LIGHT SOURCE, by J. A. Fitzpatrick, J. C. Hubbard and W. J. Thaler. Catholic University of America. Physics Dept., Washington, D. C. Apr 1950. 6p photos, table Microfilm $1.25, Photostat $1.25. PB 105351

A spark light of high intensity and short duration was provided by a coaxial cable with Ag conductors fired on a dielectric of $BaTiO_3$. A 16.5-cm. cable was used since the velocity of propagation of the discharge wave was low. The cable consists of 2 concentric cylinders of 2.5 and 5 cm. in diameter. The light-producing discharge is confined to a small hole drilled in a piece of unfired soapstone. The dielectric constant of the material forming the cable was measured at LF and HF up to 250 mc. A line terminated in its Z_0 (characteristic impedance) will discharge in a square wave of current. Comparative light intensities were made by discharging the RG8U cable and the $BaTiO_3$ cable through the same spark electrodes and allowing the divergent light to fall on the sensitive plate of a photomultiplier tube whose output was coupled to a ballistic galvanometer. To obtain the same deflection, the $BaTiO_3$ light had to be moved 30 times the distance from the photocell as the RG8U, thus indicating that the $BaTiO_3$ produced a light intensity 900 times greater. The high light intensity and short spark time make the cable convenient for studying high-speed phenomena. The light intensity and spark duration are functions of the gap spacing, current density in the gap, and type of confirming gap. Navy Contract N6-onr-225, T. O. III. Presented at A.P.S. meeting, Washington, D. C. April 28, 1950. Will not reproduce well.

IMPEDANCE MEASUREMENTS OF A LEAD-ACID STORAGE-BATTERY CELL, by J. H. Kluck. U. S. Naval Research Laboratory. Jul 1951. 16p diagrs, graph, table Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.50. PB 105059

It is believed that at high frequencies the equivalent circuit of an electrolytic cell can be represented by a series resistance and inductance. This investigation was undertaken to devise various means of measuring these two impedance components and at the same time to verify their existence in an equivalent cell circuit. The technique of using short pulses provided a means of excluding the effects of polarization impedance, thus making it possible to obtain isolated measurements of the series resistance and inductance without upsetting the desired operating conditions for the cell. For this application a simple voltage-divider arrangement in conjunction with a thyratron pulse generator was used and an analysis of this divider resulted in equations for the resistance and inductance in terms of measurable quantities. Attempts were also made to adapt ac bridge methods to this type of measurement. A pulsed bridge resulted in values which were in fairly close agreement with those obtained using a pulsed divider. The results of a conventional r-f bridge showed wide variations. Other methods including ringing measurements under transient conditions and Q-meter measurements proved inconclusive. Their worth appeared doubtful for this application. Simple circuit and ac bridge analysis resulted in equations for the effective series resistance and capacitance that would be indicated by a common bridge method. These equations indicate the variation with frequency that can be expected if the circuit assumed for bridge measurements is not

the true circuit. The indicated variation corresponds closely to some of the experimental results of others. N R L R 3839.

STUDY OF THE CHARACTERISTICS OF VACUUM TUBES WITH OXIDE CATHODES AT LOW AND HIGH FREQUENCIES, by G. Conrad Dalman. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N. Y. Oct 1949. 90p photos, drawings, diagrs, graphs Microfilm $3.75, Photostat $11.25. PB 105250

1. Vacuum tubes - Characteristic curves 2. Cathodes, Oxide 3. PIB 169.

Contract N6ori-98, Task Order IV, Project NR-075-214. Report R-224-49, PIB-169.

VACUUM-TUBE LIFE, BY D. R. BROWN, M. H. HAYES, AND J. J. O'BRIEN. SUBMITTED TO THE SPECIAL DEVICES CENTER, OFFICE OF NAVAL RESEARCH, UNDER CONTRACT N5ORI-60, PROJECT NR720-003, PROJECT WHIRLWIND. Massachusetts Institute of Technology. Servomechanisms Laboratory. Jun 1948. 82p fold drawings, diagrs, graphs, tables Microfilm $3.75, Photostat $11.25. PB 105268

1. Vacuum tubes - Life expectancy 2. Project Whirlwind 3. MIT SL R-139.

Project DIC 6345.

VACUUM TUBE LIFE EXPERIENCE, BY H. BONNELL FROST. SUBMITTED TO THE OFFICE OF NAVAL RESEARCH UNDER CONTRACT N5ORI-60, PROJECT NR-048-097, PROJECT WHIRLWIND. Massachusetts Institute of Technology. Servomechanisms Laboratory. Jun 1950. 58p diagrs (part fold), graphs Microfilm $2.75, Photostat $7.50. PB 105269

Experience with vacuum tubes in a prototype high-speed digital computer has brought to light an important type of deterioration, first identified in 1948, which results in an effective resistance, shunted by a capacitance, in series with the cathode of the affected tube. This deterioration is associated with the formation of an interface between the cathode core and coating. Methods of measuring this resistance, which may exceed 100 ohms, have been found, and many of its properties have been determined. Life tests have shown that vacuum tubes with cathode sleeves of "active" alloy are subject to this type of deterioration, whereas vacuum tubes with cathode sleeves of "passive" alloy are normally not. A tentative accelerated life test for determining susceptibility to this deterioration has been established. Experience with vacuum tubes in the prototype equipment has shown that reasonably long (greater than 10,000 hours) vacuum-tube life may be expected in conservatively-operated tubes when the above deterioration is absent or minor in nature. Project DIC 6345. MIT SL R 179.

FOOD AND KINDRED PRODUCTS

CLAM CULTURE IN JAPAN, by A. R. Cahn. Supreme Commander for the Allied Powers. Natural Resources Section. Sep 1951. 103p drawings, maps, tables Microfilm $4.50, Photostat $13.75. PB 105348

1. Clams - Japan 2. SCAP NRS 146.

FLAVORS, BEVERAGES AND CONDIMENTS. U. S. Quartermaster Food and Container Institute. Oct 1946. 161p photos, graph, tables Microfilm $6.25, Photostat $21.25. PB 105178

1. Flavoring materials 2. Beverages 3. Spices.

Quartermaster subsistance textbook, vol. IX. Contents: Part I: Flavoring agents, by Darrel Althausen and Louis A. Wright. - Part II: Spices, condiments and salt, by Lewis Allyn. - Part III: Sugars, sirups, candies and starches, by Gene McClain. - Part IV: Coffee, tea and cocoa, by Burt D. Balart and Wilbur DuBois.

PROCESSED FOODS. U. S. Quartermaster Food and Container Institute, Jun 1946. 282p photos, tables Microfilm $9.00, Photostat $36.25. PB 105177

1. Food, Canned 2. Fruit, Canned 3. Fruit juices 4. Olives 5. Pickles 6. Jam 7. Jelly 7. Peanut butter.

Quartermaster subsistence textbook, vol. IV. Contents: Part I: Canned fruits, vegetables and fruit juices, by Hatton B. Rogers, Jr. - Part II: Olives and pickles, by Dr. Reese H. Vaughn. - Part III: Fruit spreads and peanut butter, by Louis Wright and Gene McClain.

SAFEKEEPING OF SUBSISTENCE, by George Gelman and Harry R. Tennant. U. S. Quartermaster Food and Container Institute. Jul 1946. 202p photos, tables Microfilm $7.50, Photostat $26.25. PB 105176

1. Food - Storage 2. Food supply, Military.

Quartermaster subsistance textbook, vol. III.

SWEET POTATOES IN JAPAN, by Raymond E. Culbertson and James H. Boulware. Supreme Commander for the Allied Powers. Natural Resources Section. Aug 1951. 64p photos, map, drawings, graphs tables Microfilm $3.00, Photostat $8.75 PB 105148

1. Potatoes, Sweet - Japan 2. SCAP NRS 145.

FUELS AND LUBRICANTS

COAL RESEARCH LABORATORY, A PILOT PLANT FOR LOW TEMPERATURE CARBONIZATION OF COAL, by Robert Lewis Kimberly. Kentucky. Engineering Experiment Station, Lexington, Ky. Sep 1951. 51p diagrs, graphs Available from Engineering Experiment Station, College of Engineering. University of Kentucky, Lexington, Ky. PB 105323

1. Coal - Carbonization 2. Coal - Research 3. KE EES B21.

FLUORESCENCE STUDIES OF SOME SIMPLE BENZENE DERIVATIVES IN THE NEAR ULTRAVIOLET. I: FLUOROBENZENE AND CHLOROBENZENE, by Arnold M. Bass and H. Sponer. Duke University. Dept. of Physics, Durham, N. C. Feb 1950. 30p photos, diagr, tables Microfilm $2.00, Photostat $3.75. PB 105124

The vapor phase fluorescence has been studied in the near ultraviolet for a number of benzene monoderivatives. The fluorescence was excited at vapor pressures of about 10 to 20 mm. Hg using in most cases light from condensed sparks. The spark elec-

trodes were selected so that the excitation of the molecules by the light was mainly into the strong absorption region near the 0, 0 band. The fluorescence spectra were photographed on a Bausch and Lomb medium quartz spectrograph using slit widths ranging from 10 to 300 μ. The exposure times on Eastman II-0 plates were from 6 to 120 hrs. The compounds studied are benzene, chlorobenzene, and fluorobenzene. Chlorobenzene was irradiated by light from Cu, Ni, and Bi sparks and the Hg arc, but in no case could any fluorescence be detected. Fluorobenzene, when excited by a Sn spark, gives rise to a fluorescence spectrum of about 65 bands in the region 2640-2900 Å. Prominent ground state fundamental vibrations are found to occur which agree with values from Raman effect measurements. The analysis of the fluorescence spectrum of fluorobenzene is in agreement with that of the absorption spectrum, i.e., the first electronic transition (singlet terms) is an $A_1 \leftrightarrow B_1$, with the molecules having C_{2v} symmetry. Carbon ring vibrations and H vibrations appear excited in the fluorescence spectrum. Several progressions of totally symmetric vibrations are identified, and a number of bands are explained as combinations of fundamental vibrations. Symmetry assignments are suggested for some of the fundamental vibrations. Contract N6ori-107, T. O. I, NR019-106. Technical report no. 3.

SOME ASPECTS OF CATALYTIC HYDROGENATION, by Henry Eyring, Ransom B. Parlin, Merrill B. Wallenstein, Bruno J. Zwolinski. Utah. University, Salt Lake City, Utah. Sep 1950. 46p graphs, table Microfilm $2.50, Photostat $6.25. PB 105379

A competitive H-ethylene adsorption mechanism on adjacent catalyst-surface sites was evolved from the kinetic data of catalytic ethylene hydrogenation over reduced Ni catalysts. An analytical procedure is introduced to evaluate the parameters of a contact-catalytic system from pressure-time data. A graphical procedure is developed to investigate reduced variables in terms of the rate-equation parameters; the velocity extreme was predicted for various initial reactant concentrations. The theoretical fitting of pressure-time curves to the data of Toyama, Tucholski, and Rideal proved the adequacy of the model. Rate equations are developed for activated-complex models requiring single- and mixed-surface sites. The effects of competitive and noncompetitive adsorption and secondary reactions on the form of the rate equations are shown. Model curves calculated for the rate equations unsatisfactorily predicted the course of the reactions. A generalized rate equation is derived for catalytic hydrogenation in solution containing all the parameters of a 2-component 3-phase catalytic-reaction system. The analytical properties of this equation adequately explained the observed kinetic form of the available data on hydrogenation in solution, demonstrated the solvent effect, and predicted the observed temperature maxima. Technical report no. IV under Contract N7-onr-45103, Project no. NR-057-192.

SUPERCONDUCTIVITY AND LIQUID HELIUM II AT THE TEMPERATURE OF LIQUID HELIUM. TWELFTH QUARTERLY PROGRESS REPORT UNDER CONTRACT NUMBER N6ONR-225, T. O. III, ONR PROJECT NUMBER NR 016 407, SUBMITTED BY HERRICK L. JOHNSTON. INVESTIGATOR, JAMES J. FRITZ. Ohio State University Research Foundation, Columbus, Ohio. Jul 1949. 3p Microfilm $1.25, Photostat $1.25. PB 105067

1. Helium, Liquid - Superconductivity.

Progress report no. 12, Project RF-282.

THERMAL DECOMPOSITION OF ETHYLENE OXIDE, by Kurt H. Mueller. Rochester. University. Dept. of Chemistry. 1949. 93p graph, tables Microfilm $4.25, Photostat $12.50. PB 105069

1. Ethylene oxide - Thermal decomposition.

Submitted as a report on the Navy Contract N6onr-241, Task Order I to the University of Rochester under Professor W. A. Noyes, Jr. The investigations reported here are suggested and directed by Professor W. D. Walters.

VERSUCHE AN EINEM VIERKUGEL-ÖLPRÜFGERAT (TESTS ON A FOUR-BALL OIL TESTING APPARATUS), by C. F. Krienke. Deutsche Versuchsanstalt für Luftfahrt E. V. Institut für Betriebstofforschung. Mar 1943. 18f photos, drawings, graphs (Text in German) Microfilm $1.75, Enlargement Print $3.75. PB 101729

1. Oils - Testing equipment - Germany 2. Micro BIOS FD 2876/46, Item 35, Frames 1-18.

HIGHWAYS AND BRIDGES

PROCEEDINGS OF THE KENTUCKY HIGHWAY CONFERENCE HELD AT THE UNIVERSITY OF KENTUCKY, APRIL 5-6, 1951, SPONSORED BY THE COLLEGE OF ENGINEERING, UNIVERSITY OF KENTUCKY AND KENTUCKY DEPT. OF HIGHWAYS, EDITED by E. Everett Elsey. Kentucky. Engineering Experiment Station, Lexington, Ky. Jun 1951. 121p photos, maps, graphs Available from Engineering Experiment Station, College of Engineering, University of Kentucky, Lexington, Ky. PB 105322

1. Roads - Congresses 2. Roads - Construction 3. Photography, Aerial 4. KE EES B 20.

ROUGHNESS AND SKID RESISTANCE. PAPERS PRESENTED AT THE 30TH ANNUAL MEETING, 1951. Highway Research Board. Aug 1951. 59p photos, drawings, graphs, tables Available from Highway Research Board, National Research Council, 2101 Constitution Ave., Washington 25, D. C. $.90. PB 105262

The California tests included work on 50 different road surfaces. The authors believe the roughness trailer designed by the Bureau of Public Roads "is fundamentally sound and provides the simplest and most accurate measure of road roughness...developed to date." The North Carolina tests were designed to correlate riding qualities on recently constructed bituminous pavements with mix design policies and construction practices. Skid resistance measurements were made by the stopping-distance method. The paper outlines eight specific conclusions from the tests. In general, sand asphalt was found to give a better riding surface than bituminous concrete. Contents: Roughness and skid resistance measurements of pavements in California, by Ralph A. Moyer

and John W. Shupe. - Discussion by Ernest G. Wiles. Correlation of roughometer and skid tests with pavement type, design and mix, by A. Duke Morgan. HRB B 37.

INSTRUMENTS

APPARATUS FOR THE MEASUREMENT OF THE SCATTERING OF SOUND, by James J. Faran, Jr. Harvard University. Acoustics Research Laboratory. Jan 1949. 42p photos, diagra, graph Microfilm $2.50, Photostat $6.25. PB 105080

This report describes apparatus built to measure the scattering of sound by objects of size comparable with the wavelength of the sound, and of acoustic constants comparable with those of the medium. For experimental convenience, it was decided to make the measurements in water, and the method of using short pulses of sound is employed in order to make the measurements in the confined space of a tank without interference from sound reflections at the walls of the tank. The measurements are made at a frequency of 1 mc/s, using pulses from 16 to 64 μ sec. in length. A method of frequency-modulating the pulse repetition rate is used to prevent interference with the measurements by sound reverberating in the tank. The hydrophones, the tank and the apparatus for supporting the hydrophones, and the electronic equipment are described herein, and some remarks are included on the performance of the apparatus, based on preliminary measurements. A few scattering patterns are included as examples of the measurements made so far. Contract N5 ori-76, T. O. X, NR-014-903. HU ARL TM 18.

DESIGN AND CONSTRUCTION OF A SELF-CALIBRATING DILATOMETER FOR HIGH TEMPERATURE USE, by A. Lieberman and W. B. Crandall. New York State College of Ceramics, Alfred, N. Y. Jul 1950. 21p drawings (2 fold) Microfilm $2.00, Photostat $3.75. PB 105287

The apparatus consists of 2 closely spaced horizontally lined gratings, a linkage from the test specimen to one of the gratings, a means of transmitting light beams through the gratings, a photocell and means of amplifying and/or recording the photocell output. The furnace consists of a 1.75-in. Pt-Rh wound muffle, a 16-gage steel shell, a transite bottom and top cover, and suitable insulation. The sample is mounted on a sapphire disk supported by 4 sapphire rods. A fifth rod (push-rod) holds the sample under compression. The 2 gratings are 1-in. square with 200 lines/in. In moving one grating past the other, a complete cycle (from maximum light intensity to minimum and back to maximum) corresponds to 0.005 in. Accurate interpolations can be made to 5×10^{-6} in. Variation from a maximum to a minimum light intensity corresponds to a 0.0025-in. movement of the push-rod. A motion of 2.5×10^{-6} can be recorded without calibration. The constant intensity light source is a filament-type light bulb operated from a regulated voltage source; a pin hole collimates the beam. To prevent damage to the etched gratings and to insure constant spacing between them, a film of oil is used. At present a Densichron (optical density meter) is being used to measure the light intensities. A sample is set on top of the push rod, and the furnace is lowered over the specimen assembly. Radiation shields protect the grating assembly. Preliminary tests with MgO showed close correlation with the known expansion curve up to about 500°C. At 1000°C there was a difference of about 10% and at 1400°C about 12%. When temperature controlling and expansion recording devices are attached, the instrument will be automatic. Finer gratings will permit the apparatus to indicate smaller than 5×10^{-6}-in. Contract N6-ori-143, NR032-022.

DEVELOPMENT OF NRL PHOTOELECTRIC PARTICLE-SIZE METERS (OWLS), by W. L. Anderson and J. K. Thompson. U. S. Naval Research Laboratory. May 1951. 19p photos, drawings (part fold), diagr, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.50. PB 105181

Two photoelectric meters are described which will measure the particle size of monodispersed aerosols over the range of 0.2 to 0.4 micron in diameter. The meters give reproducible results and are sensitive to 0.0004 micron. The M-2 meter is designed for routine measurement of particle size; the M-3 is a more versatile instrument designed for studies of the light-scattering properties of aerosols. NRL R 3808.

HIGH SPEED SCALE X 8, TYPE AEP 908-1, by W. D. Howell. National Research Council of Canada. Atomic Energy Project. Apr 1950. 15p fold diagr, graphs, tables Available from National Research Council of Canada, Ottawa, Canada $.15. PB 105055

1. Scales, Counting - High speed - Canada 2. X 8 (High speed scale) 3. AEP 908-1 (High speed scale) 4. Atomic power - Research - Canada 5. NRCC AEP IM-9 6. NRCC 2401.

INFLUENCE OF REFRACTION ON THE APPLICABILITY OF THE ZEHNDER-MACH INTERFEROMETER TO STUDIES OF COOLED BOUNDARY LAYERS, by Martin R. Kinsler. U. S. National Advisory Committee for Aeronautics. Sep 1951. 39p diagrs, graphs, table Microfilm $2.25, Photostat $5.00. PB 105143

An analytical investigation was conducted in order to determine the influence of light refraction on the applicability of the Zehnder-Mach optical interferometer to two-dimensional cooled-boundary-layer studies. A method is presented for estimating the effects of refraction in a cooled boundary layer. Some numerical results are presented for laminar and turbulent boundary layers over a flat plate having wall to free-stream temperature ratios from approximately 0.33 to 0.9, a free-stream Mach number of 1.0, and a Reynolds number of 5×10^5. NACA TN 2462.

INSTRUMENT SERVOMECHANISMS, BY WILLIAM J. DEERHAKE AND ALBERT C. HALL. PREPARED UNDER CONTRACT N5ORI-78, TASK ORDER III, AUSPICES OF SPECIAL DEVICES CENTER, OFFICE OF NAVAL RESEARCH, U. S. NAVY. Massachusetts Institute of Technology. Dept. of Electrical Engineering. Dynamic Analysis and Control Laboratory. May 1947. 278p photos, diagrs (part fold) graphs, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $2.00. PB 104386

1. Servomechanisms 2. NAVEXOS P-536.

NOTES ON THE APPLICATION OF SR-4 STRAIN GAGES, by Howard C. Roberts. Illinois. University. Dept. of Civil Engineering, Urbana, Ill. Jul 1949. 23p diagrs Microfilm $2.00, Photostat $3.75. PB 105355

Some of the experimental difficulties which may be encountered in applying wire-type resistance strain gages and commercially available instruments for use with such gages are discussed. Contract N6 onr-71, Task order V, Project no. NR 031-182.

OPERATING AND TECHNICAL MANUAL: GENERAL PURPOSE COUNTING-RATE METER AEP 1902, by R. J. Cox. Edited by E. H. Denike. National Research Council of Canada. Atomic Energy Project. Mar 1950. 35p photo, diagrs, graphs, tables Available from National Research Council of Canada, Ottawa, Canada. $.25. PB 105054

1. Meters, Counting-rate - Operation - Canada 2. AEP 1902 (Counting-rate meter) 3. Atomic power - Research - Canada 4. NRCC AEP IM-6 5. NRCC 2398.

PHOTOGRAPHIC DIGITAL READER-RECORDER. PROGRESS REPORT #1, BY R. D. O'NEAL AND A. W. TYLER UNDER CONTRACT N6ORI-205 WITH OFFICE OF NAVAL RESEARCH, SPECIAL DEVICES CENTER. Eastman Kodak Co., Rochester, N. Y. Jun 1948. 45p diagr Microfilm $2.50, Photostat $6.25 PB 105030

1. Computers, Digital 2. Computers, Electronic 3. Computers, Time interval 4. Recorders, Photographic 5. SDC 205-1.

SEMICONDUCTORS AS ALPHA PARTICLE COUNTERS, BY DONALD H. ANDREWS, MARY CAMILLA WILLIAMS, ROBERT D. FOWLER. JOHNS HOPKINS UNIVERSITY. INSTITUTE FOR COOPERATIVE RESEARCH, BALTIMORE, MD. ANNUAL REPORT, JULY 1, 1948-JUNE 30, 1949 UNDER CONTRACT N5-ORI-166 (NRO 16-404) TASK IV. Jun 1949. 29p photos, drawings, diagrs, table Microfilm $2.00, Photostat $3.75. PB 105100

1. Alpha rays - Counters 2. Conductors, Semi 3. Bolometers 4. Crystals.

TOTALIZING PRINTER FOR LEEDS AND NORTHRUP SPEEDOMAX POTENTIOMETER, BY DONALD PARSON, JR. WOODS HOLE OCEANOGRAPHIC INSTITUTION, WOODS HOLE, MASS. TECHNICAL REPORT NO. 4 UNDER CONTRACT NO. N6 ONR-277, TASK ORDER II, NR-082-021. Jan 1950. 13p photos, diagrs Microfilm $1.75, Photostat $2.50. PB 105376

The device provides a method of integrating the area under a curve as drawn by the potentiometer and records the result continuously on the margin of the chart. The unit comprises: a ball-disk integrator which is a variable speed device with an output speed directly proportional to the product of the displacement of the pen and the speed of the chart; a counter which marks units, tens, and hundreds on the margin; and a printer. Reference no. 50-2: Marine meteorology.

W. L. MAXSON PRECISION PHASEMETER, by E.W. Helgeson. U. S. Air Materiel Command. Engineering Division. Communication and Navigation Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Oct 1950. 13p photo, diagrs, table Microfilm $1.75, Photostat $2.50. PB 105243

Design and development of a precision phasemeter is described. Relative phase angles can be measured on an oscilloscope within 1^{o} to 10^{o}; the subject phasemeter will measure any phase angle with an accuracy of one-tenth of a degree between two sinusoidal voltages of from 1/2 to 10 volts over the frequency range of 30 to 20,000 cps. For measurement of incremental angles of 2^{o} or less, the accuracy is better than one-hundredth of a degree. The method of checking calibration is discussed. Other applications are suggested for its use. It is concluded that the phasemeter is a valuable piece of laboratory equipment although it requires time and some skill in making a precise measurement. Where inaccuracies of one-quarter of a degree can be tolerated, however, the time required for measurement can be reduced. AAF TR 6260.

LUMBER AND WOOD PRODUCTS

POLICY AND PROGRAM FOR FOREST RESEARCH IN JAPAN, by George W. Trayer. Supreme Commander for the Allied Powers. Natural Resources Section. Aug 1951. 21p map, diagr Microfilm $2.00, Photostat $3.75. PB 105149

1. Forests and forestry - Research - Japan 2. SCAP NRS PS64.

MACHINERY

ANALYTICAL METHOD FOR DETERMINING PERFORMANCE OF TURBOJET-ENGINE TAIL-PIPE HEAT EXCHANGERS, by Michael Behun and Harrison C. Chandler, Jr. U. S. National Advisory Committee for Aeronautics. Sep 1951. 42p diagrs, graphs Microfilm $2.50, Photostat $6.25. PB 104976

A method of analysis is developed for computing the performance of parallel-flow-type unfinned tail-pipe heat exchangers installed on nonafterburning turbojet engines. The results of this analysis, based on assumed characteristics of a hypothetical engine, are presented in the form of working charts. Pressure drop through the heat exchanger and effect on engine performance are discussed. The performances of finned and unfinned heat exchangers are compared. NACA TN 2456.

AUSSICHTEN DER GASTURBINENANLAGEN (FUTURE OF GAS TURBINE INSTALLATIONS), by Richard Stroehlen. Mar 1947. 15f drawings, graphs Microfilm $1.75, Enlargement Print $3.75. PB 104829

1. Turbines, Gas - Germany.

From Elektrotechnische Zeitschrift 1947, no. 7, p. 150. Reprinted by Allgemeine Electricitäts Gesellschaft.

BASIC HEAT TRANSFER AND FLOW FRICTION DATA FOR GAS TURBINE PLANT REGENERATOR SURFACE MANUFACTURED BY AIR PREHEATER CORPORATION, WELLSVILLE, N. Y., by John J.

Dinan. U. S. Naval Engineering Experiment Station, Annapolis, Md. Jun 1948. 32p photos; diagrs (1 fold), graphs, tables Microfilm $2.25, Photostat $5.00. PB 104927

1. Regenerators - Tests 2. Turbines, Gas - Thermodynamics 3. Heat - Transference 4. Friction - Tests 5. Air Preheater Corp., Wellsville, N. Y. 6. NAV EES C-2171-F 7. NAVSHIPS RM 2-46 suppl. 3.

For previous reports see NAVSHIPS RM 246 (PB 39554), NAV EES C-2171-D (PB 92106), and NAV EES C-2171-E (PB 104926).

BASIC HEAT TRANSFER AND FLOW FRICTION DATA FOR GAS TURBINE PLANT REGENERATOR SURFACES MANUFACTURED BY HARRISON RADIATOR DIV., GENERAL MOTORS CORPORATION, LOCKPORT, N. Y., by John J. Dinan. U. S. Naval Engineering Experiment Station, Annapolis, Md. Jun 1948. 34p photos, drawings, graphs, tables Microfilm $2.25, Photostat $5.00. PB 104926

1. Regenerators - Tests 2. Turbines, Gas - Thermodynamics 3. Heat - Transference 4. Friction - Tests 5. NAV EES C-2171-E. 6. NAVSHIPS RM 2-46 suppl. 2.

Second of a series of supplements to NAVSHIPS RM 2-46 (PB 39554) For suppl. 1 see PB 92106.

ON THE MATHEMATICAL ANALYSIS OF AN IDEALIZED MULTIPLEX ELECTROMAGNETIC MACHINE, AN INTRODUCTION TO THE THEORY OF ELECTROMACHINERY, by Konstantin Dahr. Chalmers University of Technology, Gothenburg, Sweden. 1951. 115p diagrs Microfilm $4.75, Photostat $15.00. PB 104923

1. Machinery, Electrical - Theory - Sweden 2. Mathematical equations and solutions - Sweden.

Transactions of Chalmers University of Technology nr. 112.

METHOD OF MATCHING COMPONENTS AND PREDICTING PERFORMANCE OF A TURBINE-PROPELLER ENGINE, by Alois T. Sutor and Morris A. Zipkin. U. S. National Advisory Committee for Aeronautics. Sep 1951. 75p diagrs, graphs Microfilm $3.50, Photostat $10.00. PB 104973

Analytical expressions are derived to show the geometric, thermodynamic, and aerodynamic relations among compressor, turbine, and exhaust nozzle for a gas-turbine engine. For a known compressor performance map, a matching method is described to show some of the design compromises that must be made when the components are to be combined into a turbine-propeller engine. A method of predicting engine performance for a range of operating conditions from known component maps is presented. An illustrative example of the matching method and the performance analysis is presented, showing some of the practical limitations of engine operation. NACA TN 2450.

POWERED HAND TOOLS NO. 1: ELECTRIC TOOLS FOR WOOD-WORKING. Gt. Brit. Ministry of Works. 1951. 7p drawings, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.05. PB 105152

1. Tools, Electric - Gt. Brit. 2. Woodworking - Equipment - Gt. Brit.

Advisory leaflet no. 18.

POWERED HAND TOOLS NO. 2: PNEUMATIC AND ELECTRIC TOOLS. Gt. Brit. Ministry of Works. 1951. 6p drawings Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.05. PB 105153

1. Tools, Pneumatic - Gt. Brit. 2. Tools, Electric - Gt. Brit.

Advisory leaflet no. 19.

POWERED HAND TOOLS NO. 3: MAINTENANCE AND SAFETY PRECAUTIONS. Gt. Brit. Ministry of Supply. 1951. 6p Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.05. PB 105154

1. Tools, Electric - Maintenance and repair - Gt. Brit. 2. Tools, Pneumatic - Maintenance and repair - Gt. Brit. 3. Tools, Electric - Safety precautions - Gt. Brit.

Advisory leaflet no. 20.

PRELIMINARY INVESTIGATION OF THE EFFECT OF AN INLET DUCT ON THE PERFORMANCE OF THE KD2C POWER PLANT, by J. V. Foa and G. Rudinger. Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y. Aug 1948. 30p photo, fold diagrs, graphs, table Microfilm $2.00, Photostat $3.75. PB 105147

The operation of a pulse jet with and without an inlet duct ahead of the valve bank is analyzed in a few simple cases. It is shown that the effect of the inlet duct on the performance of the pulse jet is in many respects equivalent to that of an increase in flight speed. It is concluded that the net thrust of a pulse jet will generally decrease quite appreciably as a result of the addition of a long inlet duct. CAL DD-575-A-1.

REPORT ON VISIT TO GERMANY, TRADEMARK TRIP 37, TEAM B (M.A.A. WILLS AND G. B. GRANTHAM) FIRM: ING. L. TKACZYK, DÜSSELDORF, AUTOMATIC MACHINES FOR BURNISHING, BUFFING AND POLISHING SPOONS AND FORKS. British Intelligence Objectives Sub-Committee. Nov 1945. 15f photos, drawing Microfilm $1.75, Enlargement Print $3.75. PB 105404

1. Cutlery - Manufacture - Germany 2. Machines, Polishing - Design - Germany 3. Machines, Grinding - Design - Germany 4. Machines, Burnishing - Design - Germany 5. Tkaczyk, L., K. G., Düsseldorf, Ger. 6. Micro BIOS FD 264/51, Frames 1-13.

English abstract included. Abstract available as PB 105404s. 1p. Microfilm $1.25, Photostat $1.25.

REPORT ON VISIT TO GERMANY, TRADEMARK TRIP 37, TEAM B (M.A.A. WILLS AND G. B. GRANTHAM) FROM: MAX WLOKA, SOLINGEN, ALL CUTLERY MAKING MACHINES. British Intelligence Objectives Sub-Committee. Dec 1945. 8f photos, drawing Microfilm $1.25, Enlargement Print $2.50. PB 105406

1. Blades, Safety razor - Germany 2. Machines,

Grinding - Design - Germany 3. Wloka, Max, G.m.b.H., Solingen, Ger. 4. Micro BIOS FD 277/51, Frames 1-7.

English abstract included. Abstract available as PB 105406s. 1p. Microfilm $1.25, Photostat $1.25. For other drawings of machines made by this firm see PB 91011.

THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF AXIAL FLOW COMPRESSORS, PART 2, by John T. Bowen, Rolf H. Sabersky, W. Duncan Rannie. California Institute of Technology. Mechanical Engineering Laboratory. Jul 1949. 188p photos, graphs, tables Microfilm $6.75, Photostat $23.75. PB 105051

This report gives an account of recent investigations on axial flow turbo-machinery carried out at the California Institute of Technology. An earlier report presented a new theory for the perfect fluid flow in a turbo-machine and some experimental verifications of that theory. A principal portion of this report recounts extensive and detailed measurements of two and three dimensional flow patterns in the test compressor which verify beyond doubt the validity of the theory and indicate its general applicability and usefulness. It is believed that exploitation of this theory can lead to significant improvements in the performance and range of application of axial flow turbomachinery. In addition, a considerable amount of experimental information on the location and extent of losses in a turbo-machine is presented. Careful measurements of blade surface friction losses show that these losses are considerably greater than would be supposed from cascade tunnel tests. Other measurements on outer and inner wall boundary layers show that their rate of growth in a compressor need not be unusually rapid, as has sometimes been suggested. The study of real fluid effects, while not yet complete, provides considerable information which aids designers in predicting the exact performance, the efficiency and the range of unstalled operation of an axial flow compressor. This portion of the program supplements the turbomachine theory by allowing correction of the perfect fluid results in those cases in which real fluid effects are important. Contract N6-ori-102, Task order IV.

THERMAL INDUCTANCES OF JET ENGINE BLANKETS. METHOD FOR DETERMINATION ABOVE 1200°F, by L. F. Salzberg. U. S. Materiel Command. Engineering Division. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jul 1950. 54p photos, diagrs, graphs, tables Microfilm $2.75, Photostat $7.50. PB 105242

A technique is developed for determining the overall thermal conductance of aircraft jet engine exhaust system insulating blankets at temperatures above 1200°F. The method, which employs the conductivity tester adopted by the C-8 Committee on Refractories of the American Society for Testing Materials, represents the first adaptation of this tester to jet blanket measurements. The apparatus incorporates a globar heated chamber capable of reaching 2800°F and a guarded calorimeter to measure heat flow directly and accurately. Thermocoupling of the test samples is accomplished by condenser discharge welding of the individual couple wires to the foil surfaces of the samples, thus eliminating bead junction errors. The greatest source of error in the procedure is caused by the unreliability of blanket thickness measurement caused by flexing of the foil surfaces and the non-rigid structure of the blanket as a whole. Seven specimens typical of currently used jet engine blankets are tested in the temperature range from 1000°F to failure. Samples containing unleached glass fibers are found to be limited to hot side temperatures of approximately 1500°F. Above this point fusing of the unleached glass fibers is very pronounced. Double layers of leached glass fibers afford some protection but do not completely stop fusing of the softer glass. High silica-alumina fibers appear to hold up well at temperatures up to 2000°F resembling leached glass in this respect. Tables of observations, photographs, diagrams and plotted results are presented. AAF TR 6189.

TWO AXIAL-SYMMETRY SOLUTIONS FOR INCOMPRESSIBLE FLOW THROUGH A CENTRIFUGAL COMPRESSOR WITH AND WITHOUT INDUCER VANES, by Gaylord O. Ellis, John D. Stanitz and Leonard J. Sheldrake. U. S. National Advisory Committee for Aeronautics. Sep 1951. 34p diagrs Microfilm $2.25, Photostat $5.00. PB 105144

Solutions for axially symmetric flow through an impeller with and without inducer vanes were obtained by relaxation methods using an analysis developed in the report. The fluid was considered to be inviscid and incompressible. The impeller selected was of arbitrary design except that the impeller blades were assumed to have zero thickness and to consist of radial elements. Plots of streamlines, lines of constant velocity, and lines of constant tangential blade force are presented and discussed. NACA TN 2464.

MEDICAL RESEARCH AND PRACTICE

ANNUAL REPORT ON PRESERVATION OF DRIED AND FROZEN PLASMA, by Max M. Strumia. 1950? 18p tables (part fold) Microfilm $1.75, Photostat $2.50. PB 105364

Plasma dried from the frozen state was preserved for 9 yrs. and 4 mos. in glass bottles with hooded amber rubber stoppers covered with plastic caps; samples tested contained 0.64% residual moisture, 5.6 to 5.9% total proteins, 3.6 to 3.7% albumin, 2.0 to 2.2% globulin, and poorly preserved prothrombin. No titrable complement was present; patients showed no reaction on administration. Plasma preserved for the same period in bottles with plain black rubber stoppers did not preserve well and contained 1.79 to 1.89% residual moisture; reaction occurred on administration. Plasma processed with a mercurial preservative and regenerated to double the normal concentration showed turbidity, flocculation, prothrombin-activity loss after radiation, good complement preservation, and irradiation absorption; plasma so treated and regenerated to the original volume with 0.1% citric-acid solution showed no prothrombin or plasma-concentration change, good sterilization, and no harmful reaction on administration.

BONE MARROW IMPLANTS IN THE TREATMENT OF RADIATION SICKNESS, by John M. Talbot and Herbert B. Gerstner. U. S. Air Force. School of Aviation Medicine, Randolph Field, Tex. Sep 1951. 10p photos, graphs, tables Microfilm $1.25, Photostat $1.25. PB 105187

Study of the survival time of rats exposed to 800 r total body x-radiation, compared with that of irradiated untreated controls, resulted in the following conclusions: (1) survival time was significantly increased by shielding the hind legs during irradiation; (2) a slight increase was obtained by intravenous injections of bone marrow; (3) no noticeable change resulted from intrahepatic and intramuscular bone marrow injections; and (4) a pronounced decrease was the result of intraperitoneal bone marrow injections. In rats receiving bone marrow homotransplants during a period of marrow suppression caused by benzene or irradiation, the transplants survived three to four weeks. AAF SAM Proj 21-47-001.

CARDIOVASCULAR AND RESPIRATORY RESPONSE OF PERSONNEL SUDDENLY EXPOSED TO VERY LOW TEMPERATURE WINDBLAST, BY ALBERT W. HETHERINGTON, ULRICH C. LUFT, LOUIS E. MOSES, SYRREL S. WILKS, HENRY B. HALE, HANS-GEORG CLAMANN, DAVID W. AIKEN, RANDALL W. BRIGGS; WITH THE TECHNICAL ASSISTANCE OF SAMUEL G. KARST AND HENRY B. WHITMORE. U. S. Air Force. School of Aviation Medicine. Randolph Field, Tex. Jul 1951. 36p photos, graphs, tables Microfilm $2.25, Photostat $5.00. PB 105186

Seventy-nine subjects dressed in standard intermediate-weight USAF flying clothing were exposed to a -65° F. windblast traveling 115 to 125 m.p.h for 3 minutes. The free-fall situation was further reproduced in some by the simulation of tumbling and introduction of moderate hypoxia. Only 3 minor cases of superficial cold injury were produced, these being due to local inadequacies of insulation. Skin temperatures did not fall to dangerously low levels. Changes in respiratory and heart rates, ECG, and blood pressure were within physiological limits, and no indications of dangerous reactions were elicited. Rewarming at 70 to 85° F. restored comfort quickly. It was concluded that a free-falling flyer could drop from 50,000 feet without suffering serious harm, provided no skin areas are exposed. AAF SAM Proj 21-23-028.

COMPARATIVE PHYSIOLOGY OF THE CARDIOVASCULAR PRESSOR REFLEX MECHANISM UNDER HEAD-TO-TAIL ACCELERATION (NEGATIVE G) by Sheldon Rosenfeld and Charles F. Lombard. University of Southern California. Dept. of Aviation Medicine, Los Angeles, Calif. Oct 1949. 19p photos, table Microfilm $1.75, Photostat $2.50. PB 105122

1. Cardiovascular system - Physiology.

Contract N6ori-77, Task 1, Project NR161-014.

DETERMINATION OF HEMOGLOBIN CONTENT OF BLOOD BY X-RAY FLUORESCENCE, by L. S. Birks, E. J. Brooks, and R. T. Seal. U. S. Naval Research Laboratory. Aug 1951. 7p diagr, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $.25. PB 105300

Hemoglobin content of human blood was determined by measuring the intensity of the characteristic X-ray fluorescence line of iron. With samples of 0.3 ml of blood, the specimen preparation time was 2 to 3 minutes. Results from four samples of the same blood showed a relative probable error of ± 4.5 percent of the iron present. Determinations of specimens from four persons, two male and two female, differed by about 10 percent from determinations by the standard color-match technique. Other possible applications of X-ray fluorescence analysis are in urine analysis or determination of minerals in bone or tissue. NRL R 3867.

DETERMINATION OF MASTICATORY EFFICIENCY AND ITS CONTROLLING FACTORS, BY R. S. MANLY. CONTRACT N7 ONR-463, TASK ORDER NO. 2, NR 181-396, PERIODIC STATUS REPORT NO. 3, 1 MAY 1948-1 AUG 1948. Tufts College. Dental School, Boston, Mass. Aug 1948. 4p Microfilm $1.25, Photostat $1.25. PB 105088

1. Mastication 2. Teeth - Occlusion.

INVESTIGATION ON THE EFFECT OF ANOXIA ON THE ELECTROENCEPHALOGRAM AND ON THE BEHAVIOR OF PATIENTS WITH COMBAT FATIGUE, PSYCHONEUROSIS, AND IN NORMAL CONTROL SUBJECTS. TECHNICAL REPORT NO. 9: AUTOMATIC ANALYZER FOR THE STUDY OF SPEECH IN INTERACTION AND IN FREE ASSOCIATION. Harvard University. Medical School. Dept. of Psychiatry, Boston, Mass. Jan 1949. 19p diagrs (part fold), tables Microfilm $1.75, Photostat $2.50. PB 105119

An automatic speech analyzer for use in studying verbal activity is described. The apparatus consists of four parts. The first computes the duration of speech, and the total number of units of speech for each individual participating in an interview. The second classifies the units of speech in terms of duration in seconds and gives their frequency distribution. The third part records the number of interruptions and classifies them according to which participant interrupts and which one stops speaking after the interruption. The fourth part is a tape recorder on which the units of speech are recorded. The apparatus is used for the study of speech in the interview situation and during free association while the subject is breathing air and while breathing mixtures low in oxygen. Contract N5ori-76, Project XIV 05-664. Dr. Jacob E. Finesinger, Director.

MANUAL ARTIFICIAL RESPIRATION, by David B. Dill, Julius H. Comroe, James L. Whittenberger, Archer S. Gordon, Peter V. Karpovich. U. S. Chemical Corps. Medical Laboratories, Army Chemical Center, Md. Aug 1951. 37p photos, drawings Microfilm $2.25, Photostat $5.00. PB 105245

1. Respiration, Artificial 2. CC MD RR79.

MICROWAVE DIATHERMY TREATMENT OF FROSTBITE, by R. B. Lewis. U. S. Air Force. School of Aviation Medicine. Randolph Field, Tex. Aug 1951. 4p table Microfilm $1.25, Photostat $1.25. PB 105184

Twenty-four rabbits had one hind leg exposed to an alcohol bath at -12° C. for 30 minutes, of which 12 were immediately rewarmed with diathermy and 12

were thawed at room temperature as controls. At the end of 4 weeks the average percent muscle necrosis in the exposed leg was 1.3 ±0.5 in the diathermy-treated and 5.0±1.3 in the control group. Fifty-four rabbits were similarly exposed to −15°C. for 30 minutes, of which 27 were immediately thawed with diathermy and 27 were thawed at room temperature as controls. The animals were sacrificed on the 8th or 9th day after exposure. In 25 surviving diathermy-treated animals, the extent of skin necrosis was 4.6 ± 1.5 $cm.^2$ compared to 13.3 ± 2.1 $cm.^2$ in the 24 surviving animals of the control group. The extent of muscle necrosis was 45.7 ± 4.4 percent in the diathermy-treated and 61.9 ± 4.0 percent in the control group. AAF SAM Proj 21-23-006. Report no. 11.

RESISTANCE OF ANIMALS TO ONE STRESS AFTER EXPOSURE TO OTHER STRESSES: I: EFFECT OF COLD ON SURVIVAL AT HIGH ALTITUDES, by Charles W. Craven and Herman I. Chinn. U. S. Air Force. School of Aviation Medicine. Randolph Field, Tex. Sep 1951. 4p graphs, tables Microfilm $1.25, Photostat $1.25. PB 105185

Exposure of mice to relatively mild cold (8 to 12° C.) for 8 to 10 hours increased for a short period the survival of mice at 34,000 feet. When short exposure to severe cold was studied (30 minutes at -17°C.) there was no significant difference in survival at altitude between control animals and those with rest periods ranging from 2 to 24 hours. However, there was a trend towards increased resistance for a short period after cold exposure (2 to 4 hours) and a decreased resistance when the rest interval exceeded 16 hours. AAF SAM Proj 21-23-031. Report no. 1.

METALS AND METAL PRODUCTS

APPLICATION OF THE THEORY OF FRACTURE: THE CUTTING PROCESS, by Eugene F. Poncelet. Utah. University. College of Mines and Mineral Industries. Dept. of Ceramics. Nov 1949. 9p photos Microfilm $1.25, Photostat $1.25. PB 105070

1. Steel - Brittleness 2. Steel - Tensile properties 3. Steel - Fracture tests 4. Solids, Brittle - Cutting.

Technical report number X. Research Contract N7-onr-45101, Project Number, NR-032-168.

CALCULATION OF THE INCREASE IN THE ELECTRICAL RESISTANCE PRODUCED BY COLD-WORK (SECOND METHOD), by J. S. Koehler. Carnegie Institute of Technology. Dept. of Physics. Dec 1948. 9p diagr, tables Microfilm $1.25, Photostat $1.25. PB 105025

1. Metals, Cold-worked - Electrical properties 2. Metals - Electrical properties.

Contract N6ori-47, Task order I, NR 019-301, Technical report no. 2.

CHEMICAL THERMODYNAMICS OF METALLIC ALLOY FORMATION, BY W. E. WALLACE AND OTHERS. Pittsburgh. University. Dept. of Chemistry. Final report on Contract N6-ori-43, Task order no. 2, Project no. NR-058-004. n.d. 37p drawings, graph, tables Microfilm $2.25, Photostat $5.00. PB 105013

1. Sodium-potassium alloys - Thermal properties 2. Magnesium-cadmium alloys - Thermal properties 3. Sodium chloride-sodium bromide systems.

COMPLETE HISTORY OF MY WORK AND THE GERMAN WORK ON THE SMELTING AND REFINING OF SCRAP ALUMINUM, PRIOR TO THE WAR, DURING THE WAR, AND GERMAN PROPOSALS FOR THE FUTURE IN GERMANY; MY WAY TO SECONDARY ALUMINIUM RESEARCH, by Max Haas. n.d. 7f Microfilm $1.25, Enlargement Print $2.50. PB 104990

1. Scrap metal, Aluminum - Aluminum recovery - Germany 2. Aluminum alloys - Research - Germany 3. Micro BIOS FD 3162/47, Frames 1-8.

Abstract included. Abstract available as PB 104990s. 2p. Microfilm $1.25, Photostat $1.25.

DEVELOPMENT OF MAGNET WIRE. FINAL REPORT ON CONTRACT NO. W36-039-SC-44495, by William R. Johnson and Max Hansen. Armour Research Foundation, Chicago, Ill. Feb 1950. 21p graphs, tables Microfilm $2.00, Photostat $3.75. PB 104489

A study was made of magnet wire materials with the primary aim of developing a conductor with high conductivity and low temperature coefficient of resistance. Almost 100 experimental heats of potential magnet wire materials were melted and tested. The experimental results confirmed the original conclusion that conductivity and temperature coefficient of resistance are interdependent with a linear relationship and that high conductivity alloys all have high temperature coefficients of resistance and vice versa. Copper base alloys of 60 per cent conductivity always have a temperature coefficient of approximately 0.0023 per degree C or higher regardless of composition or microstructure. Silver alloys have somewhat better properties. Project no. 90-714B.

EFFECT OF SIGMA PHASE ON THE SHORT TIME HIGH TEMPERATURE PROPERTIES OF 25 CHROMIUM-20 NICKEL STAINLESS STEEL, by Glen J. Guarnieri, James Miller, Frank J. Vawter. Cornell Aeronautical Laboratory, Buffalo, N. Y. May 1949. 34p photos, graphs, tables Microfilm $2.25, Photostat $5.00. PB 105084

The occurrence of the sigma phase in a number of the chromium-nickel type stainless steels has been considered objectionable in many instances because of the accompanying room temperature embrittlement. Little has been known of the corresponding effect produced on the high temperature properties of these steels by their sigma content. In this investigation, using a 25Cr-20Ni stainless steel with 2Si, correlation of the high temperature tensile and creep properties (up to 100 hours duration) was made with the type and pattern of distribution of the sigma constituent. Three sigmatized micro-structures were prepared and consisted of (1) an acicular needle-like pattern, (2) a medium sigma particle size well distributed, and (3) a finely distributed sigma. Two fully austenitic structures of different grain size were also tested to isolate the effect of austenitic grain size on the high temperature properties studied. While the hard sigma phase constituent was found to increase materially the tensile and yield strength

properties of the chromium-nickel steel up to temperatures of approximately 1400°F (760°C), a corresponding decrease in long time creep strength properties occurred. This loss in creep strength under slow strain rate conditions was more pronounced with the more finely distributed sigma micro-structures. The finely divided type of sigma structure was found desirable from the standpoint of minimizing room temperature embrittlement as indicated by bend tests. Contract N6ori-119, NR 220-041. Squid technical memorandum no. CAL-26.

EFFECT OF THE ALLOYING ELEMENTS ON THE PLASTIC PROPERTIES OF ALUMINUM ALLOYS, BY JOHN E. DORN, P. PIETROKOWSKY AND T. E. TIETZ. FIFTH TECHNICAL REPORT UNDER CONTRACT N7-ONR-295, TASK ORDER II, NR-031-048. California. University. Dept. of Engineering. Div. of Engineering Research. Aug 1949. 137p graphs, tables Microfilm $5.50, Photostat $17.50.

PB 105031

The context of this report reveals that the plastic properties of aluminum alloys are functions of lattice strain and the change in the mean number of electrons per atom in solution. Excellent agreement was achieved between the experimental data for solid solution strengthening and the factors of lattice strain and the change in electron concentration per atom of solution, assuming a valence of two for aluminum in the metallic state.

EFFECTS OF COLD ROLLING ON THE TENSILE PROPERTIES OF 70/30 BRASS SHEET, by Hsing Chien Chang. Case Institute of Technology. Dept. of Metallurgical Engineering. Metals Research Laboratory, Cleveland, Ohio. Feb 1949. 45p photo, diagr, graphs, tables Microfilm $2.50, Photostat $6.25. PB 105023

The effects of cold rolling, inhomogeniety and the orientation of test specimens on the true stress and true strain properties of 70/30 brass strip, including fracture characteristics and the dimensional changes of width and thickness at fracture, were investigated. The effects of cold rolling on these properties were shown in a series of summary curves. Tensile tests at various orientations to the rolling direction and at various rolling reductions showed that cold-rolled 70/30 brass strip reveals anisotropy in fracture stress, fracture ductility and the width and thickness strains at fracture. The true stress at maximum load, tensile strength and longitudinal strain at maximum load are not appreciably dependent upon the direction of testing with respect to rolling direction for rolling reductions up to 60%. It has been found that specimens reduced 60% by rolling develop a fracture section making an angle of about 57° with the direction of testing, regardless of the direction from which the specimen was taken. Contract N6-onr-273/I, Project NR 031-049: Investigation of the effects of stress concentration and triaxiality on the plastic flow of metals, Technical report no. 15.

EIN THERMISCHES ALUMINIUM GEWINNUNGSVERFAHREN VON DR. WALTER SCHMIDT (DR. WALTER SCHMIDT'S THERMAL PROCESS FOR THE PRODUCTION OF ALUMINIUM) REPORTS by Dr. H. Borchers. Munich. Technische Hochschule. Institut für Metallurgie und Metallkunde. Aug 1940-Jun 1941. 13f (Text in German) Microfilm $1.75, Enlargement Print $3.75. PB 104987

1. Aluminum - Production - Germany 2. Micro BIOS FD 712/47, Frames 1-11.

English abstract included. Abstract available as PB 104987s. 2p. Microfilm $1.25, Photostat $1.25.

FAILURE OF METALS SUBJECTED TO LARGE REPEATED STRAINS, PROPERTIES OF CURVED TUBES AND FORCE REACTION UNITS. FINAL REPORT UNDER CONTRACT N7-ONR-284, T. O. 4, by J. L. Melcher, W. B. Good, W. A. Page and P. E. Shearin. North Carolina. University. Dept. of Physics. Jun 1949. 87p photos, diagrs, graphs, tables Microfilm $3.75, Photostat $11.25. PB 105090

The behavior of some metals and alloys has been studied when large repeated strains are applied. Strain magnitudes were selected to cause failure in the region below 20,000 cycles, to correspond to certain conditions aboard ship where shock, or high impact loadings cause repeated strains of high intensity. The dynamic modulus and the energy losses in some materials have been studied during the life of the materials subjected to high loads in an R. R. Moore Fatigue Machine. The relative abilities of some sand cast aluminum alloys to withstand high repeated strains have been determined using the R.R. Moore Fatigue Machine and a cantilever type Reversed Bending Machine. A summary of work previously reported and new data not here-to-fore presented, are given in this report. A summary of a study of the flexibility properties of curved tubes is given in Part III. This study was made to determine the flexibility factors and stress intensification factors occurring in short-radius tube bends currently used in high temperature, high-pressure strain piping systems. A summary of the progress made in calibrating an instrument suitable for measuring the end reactions of a scale model piping system is given in Part IV. Report no. VII to Naval Research Laboratory.

FUNDAMENTAL CORROSION RESEARCH. PROGRESS REPORT 22 ON CONTRACT N6 ORI-17, TASK ORDER II, PROJECT NR 031-029, FOR OCT-NOV 1949, by F. H. Beck, submitted by M. G. Fontana. Ohio State University Research Foundation, Columbus, Ohio. Dec 1949. 16p photos, tables Microfilm $1.75, Photostat $2.50. PB 105073

Recent work on high temperature oxidation studies indicates a high concentration of Cr, Ni and Si at the metal-oxide interface of the 18-8S alloy. Preliminary work in an attempt to correlate corrosion rates with corrosion currents and potentials is discussed. The effect of foreign particles (rust) in distilled water will substantially increase the erosion-corrosion of SAE 1020 steel. The role played by erosion is illustrated. A diffraction unit is under construction. Project 266.

INVESTIGATION OF THE EFFECT OF BRAZING ON THE FATIGUE STRENGTH OF STEEL, by F. M. Lister and D. G. Richards. United Aircraft Corp. Hamilton Standard Propeller Div., East Hartford, Conn. Jan 1950. 62p photos, drawing, diagrs, graphs, tables Microfilm $3.00, Photostat $8.75.

PB 104486

Results are presented of fatigue tests of two similar batches of brazed tab fatigue steel specimens. Materials for the specimens were selected from common sources and 70 specimens were fabricated with the new equipment in two batches of 35 each. An attempt was made to braze both batches in exactly the same way. All specimens were tested at zero mean stress with a nominal cyclic stress of 20,000 psi in the base bar at the tab ending. Test results were consistent inasmuch as sixty-two fractures produced involved delamination of the tab from the base bar at the tab end. A difference in average life at 20,000 psi was exhibited by the two batches. The result indicate that fillet geometry, voids, and microstructure of the brazen alloy may have an important influence on the fatigue strength characteristics. Report HSP 741. Second report under Contract W33-038-ac-18491, item 2 (HPS proposed 3313 revised).

INVESTIGATION OF THE EFFECTS OF STRESS CONCENTRATION AND TRIAXIALITY ON THE PLASTIC FLOW OF METALS. TECHNICAL REPORT NO. 13: MACRO-RESIDUAL STRESS IN METALS RESULTING FROM PLASTIC DEFORMATION, by W. M. Baldwin, Jr. Case Institute of Technology. Dept. of Metallurgical Engineering. Metals Research Laboratory. Jan 1949. 48p drawings, graphs Microfilm $2.50, Photostat $6.25.

PB 105035

While the generalized theory of the development of residual stresses is fully developed, its application to the bulk of forming operations has been impeded because of two factors: a) The stress analysis of most forming operations has been developed in the past by assuming a priori a simple, but incorrect internal stress distribution which gives a first approximation to the average stresses along certain planes in the metal. The actual internal stress distribution has remained unanalyzed. b) The experimental determination of residual stresses is tedious and time-consuming. Relatively few data of the actual residual stress distributions are known. The preponderance of residual stress data are approximations in which simple but incorrect stress distributions are assumed. Hill's recent methods of stress analysis offer hope that the first barrier can be surmounted. Only a deliberate program involving tedious and time-consuming methods can overcome the second. A description of residual stresses - as well as they are known - found in metals formed by the more important processes is given. Contract N6-onr-273/I, Project NR 031-049.

INVESTIGATION OF THE EFFECTS OF STRESS CONCENTRATION AND TRIAXIALITY ON THE PLASTIC FLOW OF METALS. TECHNICAL REPORT #16: LOW TEMPERATURE STATIC NOTCH-TENSILE CHARACTERISTICS OF A 2 3/4 PER CENT SILICON LOW CARBON STEEL, by G. L. Tuer, E. J. Ripling and G. Sachs. Case Institute of Technology. Dept. of Metallurgical Engineering. Metals Research Laboratory, Cleveland, Ohio. Mar 1949. 56p photos, diagrs, graphs Microfilm $2.75, Photostat $7.50.

PB 105063

The effect of temperature, notch-geometry, and strain rate on the notch tensile characteristics of a 2 3/4 per cent silicon steel has been investigated. For a given notch geometry and strain-rate, a decrease in testing temperature resulted in an increase in the yield strength and tensile strength. Under the same conditions, the fracture ductility decreased and the fracture stress decreased, except in that interval of temperature over which the reduction in area at fracture decreased from about 3 1/2 per cent to 1 per cent. For a given temperature and strain-rate, an increase in notch severity decreased the fracture ductility, while raising the yield strength, flow stress, tensile strength and transition temperature. For very mild and for very sharp notches, the fracture stress decreased with increasing notch severity. However, in an intermediate range of notch sharpness, the fracture stress increased. An increase in strain-rate, in general, increased the yield strength and tensile strength and raised the transition temperature. If the fracture ductility for a slow strain-rate exceeded a value of about 50 percent reduction in area, an increase in strain-rate increased the fracture stress without much change in fracture ductility. For fracture ductilities of less than 50 per cent reduction in area at a slow strain-rate, both the fracture ductility and the fracture stress decreased with increasing strain-rate. For a given notch shape, deformation of the specimen during testing introduced changes in notch geometry which were a function only of the amount of strain introduced and independent of the temperature or strain-rate at which it was introduced. Contract N6-onr-273/I, Project no. NR-031-049.

INVESTIGATION OF THE EFFECTS OF STRESS CONCENTRATION AND TRIAXIALITY ON THE PLASTIC FLOW OF METALS. TECHNICAL REPORT NO. 17: EFFECTS OF PRECOMPRESSION ON THE LOW CYCLE FATIGUE BEHAVIOR OF THE ALUMINUM ALLOY 24ST IN DIRECT STRESS, by S. I. Liu. Case Institute of Technology. Dept. of Metallurgical Engineering. Metals Research Laboratory, Cleveland, Ohio. Mar 1949. 30p diagr, graphs, tables Microfilm $2.00, Photostat $3.75. PB 105068

The effects of pre-compression on the flow and fracturing characteristics of the aluminum alloy 24ST after cyclic straining (alternate tension and compression) were investigated. The experimental results reveal that after the first two cycles, the stress-strain curves for different values of pre-compression approached each other. After small amounts of pre-compression, the first cycle strain-hardened the material, while after large amounts, the first cycle lowered the stress-strain curves to some extent. An increase in the magnitude of either of the two factors, pre-compression and cyclic straining, caused a reduction in the fracture stress of the material. Moreover, combined pre-compression and cyclic straining had a greater effect on lowering the fracture stress than the summation of the effects of the same factors applied individually. The effects of heat treatments (anneals), inserted between strain cycles, on the low cycle fatigue behavior of this material were also investigated. The experimental results indicated that cyclic straining permanently damaged the material. The behavior of the same material under a repeated (unbalanced) tension cycle at a strain interval of 0.01 was studied. The test data show that after a number of repetitions, a pronounced yield jog appeared and both the flow and fracturing characteristics were slightly lowered. Contract N6-onr-273/I, Project NR-031-049.

INVESTIGATION OF THE PROPERTIES OF STEELS AT INTERMEDIATE TEMPERATURES, by John F. Erthal and Joseph Viglione. U. S. Naval Air Material Center. Aeronautical Materials Laboratory, Philadelphia, Pa. Jan 1950. 80p photos, diagrs, graphs, tables Microfilm $3.50, Photostat $10.00. PB 104491

The room temperature mechanical properties, the impact and hardness values, and certain fatigue characteristics of SAE-4340, Inconel "X", and stainless "W" steel were determined. Prolonged heating of Inconel "X" at 900°F effected little change in the mechanical properties. An examination of stainless "W" alloy and SAE-4340 steel, after heating at 700° F for the same periods of time, revealed an increase in tensile and yield strength for "W" alloy and a decrease for SAE-4340, while the ductility and resistance to impact values decreased for "W" alloy and increased for SAE-4340. Inconel "X" has a higher resistance to creep and rupture at 900°F than "W" alloy and SAE 4340 have at 700°F. Reserve bending fatigue tests showed that "W" alloy is more resistant to failure than SAE-4340. Endurance limit of Inconel "X", at 900°F, is lower than that of the other two materials at 700°F. NAM AML 411022.

INVESTIGATION ON TEMPER BRITTLENESS OF STEEL, PT. III, by Jack K. Y. Hum and Earl R. Parker, Aug 1, 1948 to June 30, 1949. California. University. Dept. of Engineering. Jun 1949. 88p graphs, tables Microfilm $3.75, Photostat $11.25. PB 105048

This report presents additional information on the effect of composition on the temper brittleness of steel. High purity alloys were made containing combinations of iron, carbon, chromium, manganese, molybdenum, nickel and phosphorus to determine the effects of the alloying elements on the temper brittleness of steel. Iron-carbon-chromium alloys did not exhibit temper brittleness. Steels containing molybdenum did, under certain conditions, exhibit temper brittleness. Steels containing phosphorus were temper brittle. Preliminary studies of iron-carbon-manganese steels confirmed previous results that a specific amount of manganese is necessary before embrittlement will occur. Other steels containing the same elements as AISI 3312 but in different amounts, were not temper brittle. High purity iron was not temper brittle, however, grain size variation made results erractic. Age hardening alloys of copper-iron systems were not temper brittle. The possibility that metalloid elements contribute to temper brittleness is indicated by the results. Contract ONR-ori-211, N6-ori-211, T. O. II.

INVESTIGATION ON TEMPER BRITTLENESS OF STEEL. PART IV, by Jack K. Y. Hum, Earl R. Parker, Ralph Hultgren and William R. Prindle. California. University. Dept. of Engineering. Div. of Engineering Research. Nov 1949. 62p graphs, tables Microfilm $3.00, Photostat $8.75. PB 105066

This report presents additional information about the effect of composition on the temper brittleness of steel. High purity iron base alloys were made containing carbon, chromium, manganese, nickel, phosphorus, silicon, sulphur and arsenic to determine the effects of these elements on the temper brittleness of steel. Samples of two commercial AISI 3312 steels which varied greatly in transition temperature were examined and found to have large differences in phosphorus content. One of these steels which was remelted under helium improved appreciably in impact strength, but no change was observed in its temper brittlement characteristics. High purity steels containing the same elements as AISI 3312 but with very low carbon contents showed appreciable temper embrittlement. Iron-carbon-manganese alloys were temper brittle as were iron-carbon-chromium-arsenic and iron-carbon-chromium-silicon alloys. The iron-carbon-chromium-sulphur alloys were not temper brittle. Further studies with steels containing manganese and phosphorus verified the earlier conclusion that both of these elements tend to cause marked temper embrittlement. Technical report no. IV under Contract N6-ori-211, Project NR-031-185, Task Order II. Report no. series 24, Issue 4.

KINETICS OF SINTERING CHROMIUM CARBIDE, by W. G. Lidman and H. J. Hamjian. U. S. National Advisory Committee for Aeronautics. Aug 1951. 16p photos, graphs, table Microfilm $1.75, Photostat $2.50. PB 104982

The sintering of chromium carbide under a pressure was investigated in order to study the kinetics of grain growth and densification during this process. Grain growth followed the empirical equation $D^n = Kt$ where D is grain diameter, K is a rate constant, and t is sintering time. A change in n was associated with the location, size, and shape of the pores in the compact. Densification was accompanied by grain growth, and density and grain size seem to be interdependent during this stage. Grain growth continued after densification was complete, and for this stage an activation energy for grain growth was obtained. NACA TN 2491.

MEASUREMENT OF RETAINED AUSTENITE IN CARBON STEELS, by B. L. Averbach, L. S. Castleman, and M. Cohen. Massachusetts Institute of Technology. Dept. of Metallurgy. Apr 1949. 17p diagr, graphs, tables Microfilm $1.75, Photostat $2.50. PB 105024

An x-ray method previously applied to the determination of retained austenite in tool steels has been extended to the determination of retained austenite in low and medium carbon steels. Measurable quantities of austenite are found in a series of quenched plain carbon steels (both refrigerated and non-refrigerated) containing from 1.07 percent down to 0.20 percent carbon. Below 0.50 percent carbon, relatively little austenite transforms by refrigeration. Contract N5-ori-78, T. O. XXIV, D. I. C. no. 2-6593, Project NR 031-256, Technical report no. 1, 2 Feb 1948-30 Apr 1949.

NEW PROCESSES FOR OBTAINING ALUMINUM ACETATE AND FOR THE MANUFACTURE OF ALUMINUM HYDROXIDE; THE UTILIZATION OF RESIDUES RESULTING FROM THE ELECTROLYTIC REFINING OF AL. ALLOYS. Vereinigte Aluminium Werke A. G., Lünen, Ger. 1945-1946. 19f (Text in German) Microfilm $1.75, Enlargement Print $3.75. PB 104988

1. Aluminum acetate - Production - Germany
2. Aluminum hydroxide - Production - Germany

3. Aluminum alloys - Electrolytic production - Waste products - Germany 4. Micro BIOS FD 1252/47, Frames 1-19.

Letters from W. Reibling, Hans Wolf, and F. W. Wrigge. Abstract available as PB 104988s. 2p. Microfilm $1.25, Photostat $1.25.

ON THE FERROMAGNETIC RESONANCE IN NICKEL AND SUPERMALLOY, by N. Bloembergen. Harvard University. Cruft Laboratory. Feb 1950. 30p diagr, graphs, tables Microfilm $2.00, Photostat $3.75. PB 105094

Both the real and imaginary part of the high-frequency permeability of flat specimens of nickel and supermalloy have been investigated at 9050 mc./sec. and 24400 mc./sec., with a constant field H_0 parallel to the plane of the specimen. For the higher frequency experiments were extended beyond the Curie point (358°C for nickel and about 400°C for supermalloy). The decrease in saturation magnetization causes the maximum and the minimum of ferromagnetic absorption to shift toward higher field strengths. The g-factor is independent of temperature within the limit of error (2%); g = 2.12 for supermalloy and g = 2.20 for nickel. The line width in nickel increases first slowly, but above 200°C more rapidly from 250 gauss at room temperature to 700 gauss at the Curie point, the width being defined as half the width between the points where the imaginary part of the susceptibility has dropped to half its maximum value. In supermalloy the width is 100 gauss between 20°C and 300°C and then rises sharply to 350 gauss at 420°C. There is no discontinuity at the Curie point, but the intensity of the absorption drops very rapidly beyond that temperature. At the lower frequency the width is reduced by approximately a factor 1.6 in frequency. The observed data are compared with existing theories. Only interactions of the ferromagnetic spins with the lattice vibrations or the conduction electrons could probably account for the observed order of magnitude of the width. It is not clear, however, how the width could be independent over a large temperature interval, if these interactions were the only broadening agent. A pseudo-dipolar interaction introduced by Van Vleck might give an explanation for the line width at lower temperatures. Contract Nr-ori-76, Task Order I, NR 078-011. HU CL TR 97.

POLAROGRAPHIC STUDY OF CORROSION PHENOMENA, ALUMINUM AND ITS ALLOYS. TECHNICAL REPORT ON SOME OF THE WORK DONE DURING THE PERIOD OCT 1, 1948 TO JUN 30, 1949, by John H. McGee and Pierre Van Rysselberghe. Oregon. University. Dept. of Chemistry, Eugene, Oregon. 1949. 110p drawings, diagr, graphs Microfilm $4.50, Photostat $13.75. PB 105039

1. Aluminum - Corrosion 2. Aluminum alloys - Corrosion 3. Polarographic analysis.

Contract N6-onr-218, Project NR-051-041, T. O. I.

PREPARATION OF DUCTILE ALLOYS OF MANGANESE, by R. Willows. Gt. Brit. Ministry of Supply. Armament Research Establishment. Jun 1949. 15p photos, graph, tables Microfilm $1.75, Photostat $2.50. PB 104477

The preparation of ductile alloys containing at least 90% manganese which can be processed to foil only a few thousandths of an inch thick is described. Thirty alloys of manganese were prepared and their ductility tested by means of a compression test. An alloy containing 8% copper and 92% manganese was found to have most suitable combination of properties. Small ingots of this alloy were rolled to 0.008 in. thickness by cold rolling and interstage annealing. The rate of transformation from gamma to the brittle alpha form was studied for various degrees of cold work, at three temperatures and various periods of heating up to 2 hr. It is shown that the rate of change of the transformation is a minimum in material which was reduced in thickness about 10 to 20% by cold rolling, but greater reductions accelerate the change. Metallurgical report no. 5/49.

PRESENT POSITION AND FUTURE POSSIBILITIES FOR PRODUCING ALUMINIUM; PRODUCTION OF CALCIUM ALUMINATE SLAG, by Max Haas. 1945. 13f Microfilm $1.75, Enlargement Print $3.75. PB 104991

1. Aluminum - Production - Germany 2. Slag, Calcium aluminate - Production - Germany 3. Micro BIOS FD 3298/47, Frames 1-10.

Abstract included.

REACTIONS OF ZIRCONIUM AND COPPER WITH SEVERAL IONIZED GASES, by Andrew Dravnieks. Illinois Institute of Technology. Dept. of Chemistry, Chicago, Ill. Aug 1949. 21p drawing, diagr, graphs Microfilm $2.00, Photostat $3.75. PB 105042

The reaction rates of zirconium at 986°C. with low pressure nonionized and ionized oxygen, air, water vapor, carbon dioxide, carbon monoxide, nitrogen with 0.5 per cent oxygen, technical helium and ethane were studied conductometrically. In some cases an acceleration, in others a retardation of the reaction upon ionizing the gas was observed. The retardation may be due to a clean-up effect on the surface of the metal or scale by the non-reacting components of the gas phase. The oxidation in water vapor seems abnormally fast as compared with the oxidations in carbon oxides. The oxidation of copper in non-ionized and ionized gases at 750°C. was studied. The thermodynamically possible oxidation of copper in nitrogen with 0.5 per cent oxygen was not observed. Ionization of carbon dioxide causes slow parabolic oxidation of copper but carbon monoxide does not. A method of continuous recording of the progress of oxidation of metal strips at high temperatures is described. Contract N7-onr-329, T. O. II: Reactions of metals with gases at high temperatures. Technical report no. 2.

REFRACTORIES FOR MELTING TITANIUM, PART I, by L. W. Eastwood and C. M. Craighead. U. S. Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Jun 1950. 26p photos, diagrs, tables Microfilm $2.00, Photostat $3.75. PB 105008

The report contains an account of all the work done on refractories for melting titanium during the two-year period May 18, 1948 to May 18, 1950. Summary report Part 1 covers the period May 18, 1948 to May 18, 1950 under Contract no. AF 33(038)-3736 with Battelle Memorial Institute. This section of the report is a continuation of the earlier work on the

evaluation of refractories for melting titanium under the Wright-Patterson Air Force Base Contract no. W-33-038-ac-21229. (PB 104457). See PB 105009 for Part 2. AAF TR 6218, part 1.

RESEARCH AND DEVELOPMENT ON TITANIUM ALLOYS, PART 2, by L. W. Eastwood and C. W. Craighead. U. S. Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Jun 1950. 185p photos, graphs, tables Microfilm $6.25, Photostat $23.75. PB 105009

Report covers the work on the preparation and evaluation of titanium alloys and analytical methods for the determination of oxygen in titanium. Summary report Part 2 of "Refractories for Melting Titanium" covers the period May 18, 1949 to June 30, 1950 under Contract AF 33(038)-3736 with Battelle Memorial Institute. See PB 105008 for Part I. AAF TR 6218, part 2.

RHEOTROPIC EMBRITTLEMENT OF STEEL, by E. J. Ripling and W. M. Baldwin, Jr. Case Institute of Technology. Dept. of Metallurgical Engineering. Metals Research Laboratory. Feb 1950. 59p photo, diagrs, graphs, tables Microfilm $2.75, Photostat $7.50. PB 104473

The term "rheotropic embrittlement" is used to describe a type of brittleness at low temperatures which can be removed in part by cold work at relatively high temperatures. A large part of the low-temperature ductility deficiency of SAE 1340 steel when furnace cooled as well as when quenched and tempered in the vicinity of 600°F was found to be rheotropic. The low-notched ductility at high-strength levels is also the result of this type of brittleness. The embrittlement accounts for the dangerously high transition temperature in both heat-treated SAE 1340 and annealed steels. The condition under which rheotropic embrittlement occurs is found to be either not cumulative under low-temperature straining, or cumulative but readily washed out by room temperature deformation. Technical report no. 20. Contract N6-onr-273/I. Project NR031-049.

STUDY OF POURING METHODS AND GATING DESIGN FOR LIGHT ALLOYS, by Roy Erwin Swift. Jun 1949. 296f photos, diagrs, tables Microfilm $9.00, Enlargement Print $40.00. PB 104472

Pouring methods and gating design were studied for the production of sound light-alloy castings. Transparent molds were used with water as the pouring liquid. Studies of the flow and air entrainment behaviors of the liquids, water, mercury, and Wood's metal, were made. A comparison of the results of these studies and the physicochemical properties of the liquids used indicated that the pouring of water into transparent molds may be used to simulate the pouring of liquid light alloys into sand molds. A number of practices are listed which aid in minimizing gas and dross defects in the finished castings. The surface area of all horizontal sections of the pouring box should be kept at a minimum. Tapered sprues should be employed with the big end up. Gating should be streamlined at sudden changes in cross-sectional area and in the direction of the passage. The first metal poured should be trapped. Thesis-Yale University.

SUMMARY REPORT ON CHROMIUM-BASE ALLOYS, JAN 1948-FEB 1949, by W. L. Havekotte and C. T. Greenidge. Battelle Memorial Institute, Columbus, Ohio. Oct 1949. 45p photos, tables Microfilm $2.50, Photostat $6.25. PB 105097

1. Chromium alloys 2. Chromium-iron - Molybdenum alloys.

Contract no. N5 ori-111, Task order I, Project NR-031-003. For earlier report see PB 99968.

SURVEY ON THE LOSS OF METALS WITH SPECIAL REGARD TO ALUMINIUM, by Max Haas. n.d. 14f diagrs, tables Microfilm $1.75, Enlargement Print $3.75. PB 104989

1. Aluminum - Production - Germany 2. Aluminum - Waste products - Germany 3. Micro BIOS FD 3156/47, Frames 1-12.

Abstract included. Abstract available as PB 104989s. 2p. Microfilm $1.25, Photostat $1.25.

THEORY OF CONDUCTIVITY OF COLD-WORKED COPPER, by Rolf Landauer. U. S. National Advisory Committee for Aeronautics. Sep 1951. 23p diagrs Microfilm $2.00, Photostat $3.75. PB 105146

The increase in the resistivity of copper under cold working is calculated. The increase is assumed to be caused by dislocations surrounded by a long-range electrostatic field that scatters the conduction electrons. The amount of scattering is found by the method of deformation potentials of Bardeen and Shockley. The scattering is present in addition to the normal thermal scattering and is regarded as a perturbation in the Boltzmann equation. This perturbation is used to find the incremental resistance per dislocation. From this calculated increment in resistance and the known increase of resistivity of heavily cold-worked copper, the number of dislocations in the cold-worked copper is found to be 5' x 10^{11}/square centimeter, in agreement with the number estimated on the basis of stored energy measurements. NACA TN 2439.

ÜBER DAS KRIECHVERHALTEN TECHNISCHER ZINKLEGIERUNGEN (CREEP BEHAVIOR OF TECHNICAL ZINC ALLOYS), by K. Löhberg. Metallgesellschaft A. G., Frankfort, Ger. Feb 1941. 22f photos, graphs (Text in German) Microfilm $2.00, Enlargement Print $5.00. PB 102213

1. Zinc alloys - Creep tests - Germany 2. Micro BIOS FD 242/48, Frames 662-681.

English abstract included. Abstract available as PB 102213s. 1p. Microfilm $1.25, Photostat $1.25.

USE OF RADIOCALCIUM TO STUDY THE DISTRIBUTION OF CALCIUM BETWEEN MOLTEN SLAGS AND IRON SATURATED WITH CARBON, by W. O. Philbrook, Kenneth M. Goldman and Martha M. Helzel. Carnegie Institute of Technology. Metals Research Laboratory. Aug 1949. 39p drawings, tables Microfilm $2.25, Photostat $5.00. PB 105032

Radioactive calcium has been used to learn whether calcium can be detected in iron saturated with carbon after it has been melted under $CaO-Al_2O_3-SiO_2$ slags similar to those used in the iron blast furnace.

It was hoped that the radioactive tracer technique might make possible a general study of steelmaking reactions in which calcium or calcium oxide are involved. No calcium could be found in the metal under conditions which were favorable for the reduction of calcium, and it has been concluded that the calcium content of the iron was less than 6×10^{-5} per cent. Some of the problems encountered have been instructive with regard to pitfalls and limitations of tracer methods. Contract N6ori-47/IV, Project NR 031-014. Submitted for publication in the Journal of Metals.

X-RAY DIFFRACTION STUDIES OF SILICON COATED MOLYBDENUM, BY J. W. JAKUBOWSKI. U. S. NAVAL AIR MATERIAL CENTER. AERONAUTICAL MATERIALS LABORATORY, PHILADELPHIA, PA. PROGRESS REPORT, DEC 1948-DEC 1949. May 1950. 29p photos, diagrs, tables Microfilm $2.00, Photostat $3.75. PB 104481

X-ray diffraction studies were made of silicon coated molybdenum sheet specimens, in order to determine the crystal system and lattice parameter of the unit cell of the coating, its grain size, and the possible existence of preferred orientation of the crystallites on the surface of the specimen. The coating was determined to be molybdenum disilicide ($MoSi_2$), having a body centered tetragonal structure, containing two mol. per unit cell. Lattice constants were determined to be $3.20A^{o}$ and $7.831A^{o}$, resulting in an axial ratio of 2.45. The grain size as determined by x-ray diffraction was 0.014 mm, and the theoretical density of $MoSi_2$ was 6.23 per cm^3. Preferred orientation was noted to exist in the coating. A pole figure showed this orientation to have the base of the unit cell in the plane of the sheet with the directional parallel to the longitudinal axis. Appendix: Crystallographic analysis of molybdenum disilicide. NAM AML 411017.4, pt. I.

MINERALS AND MINERAL PRODUCTS

DETERMINATION OF THE AVERAGE ATOMIC WEIGHT OF RARE EARTH MIXTURES, by Archie G. Buyers, Elizabeth B. Mohr, L. F. Audrieth and R. A. Johnson. Illinois. University, Urbana, Ill. Aug 1949. 40p graph, tables Microfilm $2.25, Photostat $5.00. PB 105102

1. Earths, Rare - Atomic weights 2. Atomic weights - Tables 3. Atomic power - Research. Contract N6 ori-71, Chemistry task no. VII.

FORMATION OF REFRACTORY COATINGS BY VAPOR-DEPOSITION METHODS, by C. F. Powell, I. E. Campbell and B. W. Gonser. Battelle Memorial Institute, Columbus, Ohio. Mar 1949. 102p photos, drawings, tables Mimeo: $2.75. PB 104288

Vapor-deposition methods have been used to form refractory coatings of metals, carbides, silicides, borides, nitrides, and oxides. The materials for the coatings, the processes and techniques used, and the characteristics of the coatings are discussed. Coatings ranging from a few microns to several millimeters in thickness may be deposited on a variety of bases. In practice, the minimum thickness required to protect the base is used if the coating is brittle or if there is a difference in the coefficient of expansion. Most of the coatings can be formed by processes operating at atmospheric and moderately high temperature, although vacuum processes offer some advantages in preparing high-purity materials. Most of the coatings can be produced at $1000^{o}C$ and 12000^{o} C. Possible applications of the coatings produced by vapor-deposition processes are discussed. R-137, Rand Corporation, Santa Monica, Calif. U. S. Air Force. Project Rand.

OBSERVATIONS ON THE RARE EARTHS: SOME STUDIES IN THE ABSORPTION SPECTRA, by Therald Moeller and John Calvin Brantley. Illinois. University, Urbana, Ill. Sep 1949. 92p graphs, tables Microfilm $4.25, Photostat $12.50. PB 105076

Absorption coefficients and complete absorption spectra from 2200 A to 10000 A of many of the rare earth ions in aqueous solutions are given. The salt solutions studied are the chlorides, nitrates, acetates, and in some cases the perchlorates. An analytical procedure for estimation of the rare earth ions in chloride and perchlorate solutions by spectrophotometric methods has been established. In addition, the completeness of resolution of the bands chosen for analytical purposes has been investigated. It is shown that the chloride solutions of praseodymium, neodymium, samarium, europium, thulium and ytterbium obey Beer's Law. Erbium perchlorate solutions also obey this law. Gadolinium salt solutions do not obey it. It is also shown that the absorption coefficients of the chloride solutions of the cerium earths are not affected by excess chloride ion. On the other hand, the chloride solutions of the yttrium earths are affected by excess chloride ion as shown by an increase in the absorption coefficient when excess chloride is added or when the solutions stand for some time. Perchlorate solutions of the yttrium earths are not affected by excess perchlorate ion. They are, therefore, to be preferred for analytical purposes when the yttrium earths are the subject of analysis. A study of the effects of other anions, notably the acetate, chloride, tartrate, and ethylenediamine tetracetate, on the absorption spectra of neodymium chloride and erbium perchlorate has been carried out. In studying the possible formation of complex ions in solution only one complex ion was found. The ethylenediamine tetracetate ion forms a complex with the neodymium ion in a 1:1 ratio. Evidence was found that the acetate and tartrate ions form stable ionic aggregations in solution when there are six of these anions to one neodymium ion. The chloride ion also forms stable configurations with the erbium ion when the molar concentrations are 3:1 and 6:1. The ability of the tartrate and ethylenediamine tetracetate ions, the former only in basic solution, to set up stable complexes in neodymium chloride solutions might be inferred from the splitting of the 5750 A band of neodymium solutions into component levels. This 5750 A band of neodymium chloride is split into six well-defined lines by a high concentration of ethylenediamine tetracetate ions (or more probably by an increase in pH) in the solution. This is the same number of lines which is found for neodymium chloride hexahydrate crystals in this region of the spectrum. Contract N6 ori-71, Chemistry task no. VII.

ON THE FRACTURE OF GLASS WHICH IS SUBJECTED TO A SLOWLY INCREASING STRESS, by Peter Gibbs and Ivan B. Cutler. Utah. University, Salt

Lake City, Utah. Aug 1950. 30p photos, diagrs, graphs, tables Microfilm $2.00, Photostat $3.75. PB 105377

The fracture of glass subjected to slowly increasing tensile stress was analyzed on a statistical mechanical basis. The fracture was considered to be composed of the breaking of atomic bonds around a pit in the lattice structure. The surface where the fracture originates was represented as a continuum over which flaws (pits) of differing critical breaking stresses were distributed. The distribution function (g) for the flaws was given by $S\ \sigma^b$, where σ is the tensile stress initiating the fracture and S and b are constants which are properties of the surface for slowly increasing stresses. The testing procedure and nature of the flaws are discussed. Technical report no. XIII under Contract N7-onr-45101, Project no. NR-032-168.

PHOSPHATES AND POLYPHOSPHATES OF THE RARE EARTHS AND THORIUM, by A. G. Buyers and L. F. Audrieth. Illinois. University, Urbana, Ill. Mar 1950. 92p graphs, tables Microfilm $4.25, Photostat $12.60. PB 105101

A study has been made of the phosphates and polyphosphates of the rare earths and thorium using a number of different experimental approaches in order to characterize more definitely the chemical composition of these materials as well as their properties. Three experimental procedures have been employed involving 1) the so-called hydrogen ion displacement procedure which was used effectively in the case of the rare earths, 2) a combined pH and conductometric procedure which was used both for the rare earths and thorium and 3) gravimetric methods for the purpose of determining the composition of a number of phosphate and polyphosphate precipitates. These studies have disclosed that the normal orthophosphates of the rare earths and thorium are precipitated when the respective ions are allowed to react in aqueous solutions. It has also been shown that normal pyro and triphosphates of the rare earths precipitate when solutions of rare earths and the respective polyphosphate ions are adjusted to a pH of 4.5. Back titration of the liberated hydrogen ion indicates that the resulting products, despite their gelatinous and obviously hydrated nature, consist essentially of the pyrophosphate and triphosphate. Precipitation of the pyro- and tri-phosphates of the rare earths is effected at room temperatures. The precipitates are quite gelatinous. If these are then digested in their own mother liquor or are filtered and then subsequently digested in pure water in order to effect recrystallization or aggregation to yield a more readily filterable product, hydrolysis takes place with the conversion of these polyphosphates eventually to the simpler orthophosphates. It is therefore not possible to effect the formation of more crystalline pyro- and triphosphates of the rare earths by digestion, or by slow precipitation at higher temperatures. Most significant are the findings which have to do with the formation of polyphosphate complexes of the rare earths and of thorium. The ortho-, pyro, and triphosphates precipitate the rare earths and thorium completely over definite pH ranges (around 4.5 for the rare earths and between 1-3 for thorium). It is important to note that the rare earths precipitates go into solution on addition of excess of pyrophosphate reagent at a pH of about 8, and above a pH of 7 when excess triphosphate is used. In the case of thorium, a soluble complex with pyrophosphate is formed at a pH above 7 and with triphosphate at a pH above 5. The exact nature of these polyphosphate complexes has not yet been determined. Consideration of these facts indicates that it should be possible to effect separation of thorium from the rare earths by precipitation of the thorium at a pH of 1, using either aqueous triphosphate or pyrophosphate as precipitants or by formation of soluble complexes of thorium at a pH above 5, under which conditions the rare earths form insoluble triphosphates. Further work is now in progress in order to determine the exact nature of the polyphosphate complexes and also to evaluate the possibility of separating the rare earths and thorium by use of the differences which have revealed themselves in the present study. Contract N6 ori-71, Chemistry task no. VII.

PRECASTING HIGHWAY BRIDGES AND STRUCTURES by R. B. McMinn. Highway Research Board. Paper presented at the 30th annual meeting. 1951. Aug 1951. 22p photos, drawings Available from Highway Research Board, National Research Council, 2101 Constitution Ave., Washington 25, D. C. $.45. PB 105263

The report discusses recent, rapid advances in the use of precast members for building construction and the considerable interest exhibited in applying precasting to bridges and highway structures. One system of precasting combines precast stringers with cast-in-place slabs to form T-beam spans. The second system consists of assembling precast beams and precast slabs and cementing together these structural members. Mention is made of developments in prestressing precast units. Advantages in working with precast members include: (1) savings in forms, falsework, and placing of concrete; (2) elimination of considerable on-the-job labor; (3) speeding up of construction; (4) facilitation of maintenance of traffic; (5) closer control of concrete mixture, placing, and curing; and (6) expedition of construction through precasting under cover during the winter season. HRB B39.

PACKING AND PACKAGING

LACQUERING METHODS FOR FOOD CANS, by William Pilcher and Charles Mancan. U. S. Army. European Theater of Operations. Jul 1945. 5p Microfilm $1.25, Photostat $1.25. PB 105266

1. Cans (Containers) - Germany 2. Containers, Food - Coatings - Germany 3. BIOS M16.

Food reconnaissance memorandum no. 9. Visit to Herman Wiederhold, Lack und Lackfabrik, Hilden/Rhld.

PERSONNEL APTITUDE TESTING

ACTIVITIES OF EMPLOYED SCIENTISTS AND ENGINEERS FOR KEEPING CURRENTLY INFORMED IN THEIR FIELDS OF WORK, BY DOUGLAS E. SCATES AND ALICE V. YEOMANS. AMERICAN COUNCIL ON EDUCATION. RESEARCH STAFF ON SCIENTIFIC PERSONNEL, WASHINGTON, D. C. REPORT OF A PROJECT SPONSORED BY THE MAN-

POWER BRANCH HUMAN RESOURCES DIVISION, OFFICE OF NAVAL RESEARCH, CONTRACT N7 ONR-422. Aug 1950. 43p tables Microfilm $2.50, Photostat $6.25. PB 104933

1. Scientists - Education.

CRITICAL REQUIREMENTS FOR RESEARCH PERSONNEL, A STUDY OF OBSERVED BEHAVIORS OF PERSONNEL IN RESEARCH LABORATORIES, by John C. Flanagan and others. American Institute for Research, Pittsburgh, Pa. Mar 1949. 71p graphs, tables Microfilm $3.50, Photostat $10.00. PB 104946

1. Performance tests 2. Personnel, Research - Records.

Project sponsored by Scientific Personnel Advisory Committee of the American Council on Education.

DEFINITIONS OF OCCUPATIONAL SPECIALTIES IN ENGINEERING. American Society of Mechanical Engineers. Jun 1951. 112p Microfilm $4.75, Photostat $15.00. PB 104935

1. Engineering - Handbooks, manuals, etc.

Vol. II of its Survey of selected engineering personnel (PB 104936). — ?

DEVELOPING A DEPTH ESSAY QUESTIONNAIRE TO ASSESS THE MARKET FOR FURTHER EDUCATION AMONG EMPLOYED SCIENTISTS AND ENGINEERS, BY DOUGLAS E. SCATES AND ALICE V. YEOMANS. AMERICAN COUNCIL ON EDUCATION. RESEARCH STAFF ON SCIENTIFIC PERSONNEL, WASHINGTON, D. C. REPORT OF A PROJECT SPONSORED BY THE MANPOWER BRANCH, HUMAN RESOURCES DIVISION, OFFICE OF NAVAL RESEARCH, CONTRACT N7 ONR-422. Aug 1950. 138p graphs, tables Microfilm $5.50, Photostat $17.50. PB 104937

1. Questionnaires 2. Personnel, Naval - Training 3. U. S. Office of Naval Research. Human Resources Division. Manpower Branch.

DEVELOPING AN OBJECTIVE ITEM QUESTIONNAIRE TO ASSESS THE MARKET FOR FURTHER EDUCATION AMONG EMPLOYED ADULTS, BY DOUGLAS E. SCATES AND ALICE V. YEOMANS. AMERICAN COUNCIL ON EDUCATION. RESEARCH STAFF ON SCIENTIFIC PERSONNEL, WASHINGTON, D. C. REPORT OF A PROJECT SPONSORED BY THE MANPOWER BRANCH, HUMAN RESOURCES DIVISION, OFFICE OF NAVAL RESEARCH, CONTRACT N7 ONR-422. Aug 1950. 55p tables Microfilm $2.75, Photostat $7.50. PB 104934

1. Questionnaires 2. Personnel, Naval - Training 3. U. S. Office of Naval Research. Human Resources Division. Manpower Branch.

DEVELOPMENT OF A TEST FOR SELECTING RESEARCH PERSONNEL, by Mary H. Weislogel and others. American Institute for Research, Pittsburgh, Pa. Jan 1950. 38p drawings, graphs Microfilm $2.25, Photostat $5.00. PB 104943

1. Ability tests 2. Personnel, Research - Selection 3. U. S. Office of Naval Research. Human Resources Division. Manpower Branch.

Second in a series of reports prepared under the sponsorship of the Manpower Branch, Human Resources Division, Office of Naval Research. For Technical appendices see PB 104943s.

DEVELOPMENT OF TESTS FOR EVALUATING RESEARCH PROFICIENCY IN PHYSICS AND CHEMISTRY, BY MARY H. WEISLOGEL AND OTHERS. AMERICAN INSTITUTE FOR RESEARCH, PITTSBURGH, PA. PROJECT DESIGNATION NR385-016. Apr 1951. 45p diagr, graph Microfilm $2.50, Photostat $6.25. PB 104939

1. Performance tests 2. Personnel, Research - Records 3. Chemical research - Ability tests 4. Physics - Research - Ability tests 5. U. S. Office of Naval Research. Human Resources Division. Man - Power Branch.

Fourth in a series of reports prepared under the sponsorship of the Manpower Branch, Human Resources Division, Office of Naval Research.

EDUCATIONAL STATUS, NEEDS, AND OPPORTUNITIES OF INDUSTRIAL RESEARCH SCIENTISTS IN THE PHILADELPHIA METROPOLITAN DISTRICT, BY ALICE V. YEOMANS, GRACE G. OBER, DOUGLAS E. SCATES. AMERICAN COUNCIL ON EDUCATION. RESEARCH STAFF ON SCIENTIFIC PERSONNEL, WASHINGTON, D. C. REPORT OF A PROJECT SPONSORED BY MANPOWER BRANCH, HUMAN RESOURCES DIVISION, OFFICE OF NAVAL RESEARCH, CONTRACT N7 ONR-422. Jan 1951. 83p tables Microfilm $3.75, Photostat $11.25. PB 104932

1. Scientists - Education 2. Scientific research 3. U. S. Office of Naval Research. Human Resources Division. Manpower Branch.

EFFECT OF QUESTIONNAIRE FORM ON COURSE REQUESTS OF EMPLOYED ADULTS, BY DOUGLAS E. SCATES AND ALICE V. YEOMANS. AMERICAN COUNCIL ON EDUCATION. RESEARCH STAFF ON SCIENTIFIC PERSONNEL, WASHINGTON, D. C. REPORT OF A PROJECT SPONSORED BY THE MAN POWER BRANCH, HUMAN RESOURCES DIVISION, OFFICE OF NAVAL RESEARCH, CONTRACT N7 ONR-422. Oct 1950. 54p graphs, tables Microfilm $2.75, Photostat $7.50. PB 104930

1. Questionnaires 2. Psychological research 3. Personnel, Naval - Training 4. U. S. Office of Naval Research. Human Resources Division. Manpower Branch.

PROCEDURES FOR EVALUATING RESEARCH PERSONNEL WITH A PERFORMANCE RECORD OF CRITICAL INCIDENTS, by Mary H. Weislogel and others. American Institute for Research, Pittsburgh, Pa. Jun 1950. 47p diagrs, graphs, tables Microfilm $2.50, Photostat $6.25. PB 104944

1. Personnel, Research - Records 2. Performance tests 3. U. S. Office of Naval Research. Human Resources Division. Manpower Branch.

Third in a series of reports prepared under the sponsorships of the Manpower Branch, Human Resources Division, Office of Naval Research. For Technical appendices see PB 104944s.

RECOMMENDATION BLANK TO AID IN THE SELECTION OF SCIENTIFIC AND TECHNICAL PERSONNEL, PREPARED by Harold A. Edgerton and Marion W. Richardson. Richardson, Bellows, Henry & Co., Inc., New York, N. Y. Jun 1949. 13p table Microfilm $1.75, Photostat $2.50. PB 104942
1. Personnel - Records 2. Personnel - Selection.

SCIENTIFIC AND PROFESSIONAL PERSONNEL: EXAMINATION DEVELOPMENT AND SELECTION TECHNIQUES, A BIBLIOGRAPHY, by Margaret Rohrer. California. University. Bureau of Public Administration, Berkeley, Calif. Jul 1950. 49p Microfilm $2.50, Photostat $6.25. PB 104938
1. Personnel - Selection - Bibliography 2. Scientists - Selection - Bibliography.

SCIENTIFIC PERSONNEL, A BIBLIOGRAPHY COMPILED BY MABEL H. ELLER AND JACK WEINER, EDITED BY BARTON BLEDSOE. U. S. LIBRARY OF CONGRESS. NAVY RESEARCH SECTION. PREPARED FOR THE OFFICE OF NAVAL RESEARCH UNDER CONTRACT NA ONR-13-47. Jul 1950. 168p Microfilm $6.25, Photostat $21.25. PB 104940
1. Personnel - Bibliography 2. Scientists - Bibliography.
Includes literature published 1930-1948.

SELECTED OPERATING DATA FOR INDUSTRIAL RESEARCH LABORATORIES, A PRELIMINARY REPORT FOR COOPERATORS IN THE RESEARCH CONTROL SURVEY, by Robert N. Anthony. Harvard University. Graduate School of Business Administration. Div. of Research. 1951. 51p tables (part fold) Microfilm $2.75, Photostat $7.50. PB 104941
1. Industrial research 2. Management, Administrative.
Project financed partly by the Office of Naval Research under Contract N5 ori-97636 and partly by the Associates of the Harvard Business School.

SELECTION OF PHYSICAL SCIENTISTS, by Willis C. Schaefer. n.d. 50p tables (1 fold) Microfilm $2.50, Photostat $6.25. PB 104945
1. Scientists - Selection 2. Scientists - Tests.
Summarizes work accomplished under ACE-ONR Contract N7 onr-422, Task I from Nov 1947 through June 1949 by the U. S. Civil Service Commission.

SUPERVISORS' ESTIMATES OF EDUCATIONAL NEEDS AMONG THEIR SUBORDINATES, BY DOUGLAS E. SCATES AND ALICE V. YEOMANS. AMERICAN COUNCIL ON EDUCATION. RESEARCH STAFF ON SCIENTIFIC PERSONNEL, WASHINGTON, D. C. REPORT OF A PROJECT SPONSORED BY THE MANPOWER BRANCH, HUMAN RESOURCES DIVISION, OFFICE OF NAVAL RESEARCH, CONTRACT N7 ONR-422. Sep 1950. 48p Microfilm $2.50, Photostat $6.25. PB 104931
1. Personnel, Naval - Training.

SURVEY OF SELECTED ENGINEERING PERSONNEL, PREPARED FOR OFFICE OF NAVAL RESEARCH UNDER TASK ORDER N7 ONR-36602 BY THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS FOR THE ENGINEERS JOINT COUNCIL. AMERICAN SOCIETY OF MECHANICAL ENGINEERS. VOL. I: REPORT. Sep 1950. 52p Microfilm $2.75, Photostat $7.50. PB 104936
1. Engineers - Directories.
For vol II see PB 104935. C. E. Davies, Chairman; R. A. Wentworth, Director.

TECHNICAL APPENDICES AND MANUAL FOR THE USE OF THE PERFORMANCE RECORD FOR RESEARCH PERSONNEL. American Institute for Research, Pittsburgh, Pa. Feb-Jun 1950. 120p tables Microfilm $4.75, Photostat $15.00. PB 104944s
Appendices to PB 104944.

TECHNICAL APPENDICES FOR THE DEVELOPMENT OF A TEST FOR SELECTING RESEARCH PERSONNEL. American Institute for Research, Pittsburgh, Pa. Jan 1950. 63p Microfilm $3.00, Photostat $8.75. PB 104943s
Appendices to PB 104943.

PHYSICS

General

GAS ABSORPTION, A STUDY OF THE VARIABLES AFFECTING MASS TRANSFER, by Harold Arthur Blum. Aug 1949. 122p diagrs, graphs, tables Microfilm $5.00, Photostat $16.25. PB 105037
1. Carbon dioxide - Absorption 2. Gases - Transference.
Thesis-Northwestern University, Evanston, Ill. Contract N6 ori-158, T. O. III, NR261-018.

K VOPROSU O POVEDENII BYSTRODVIZHUSHCHEGOSYA POTOKA SZHIMAEMOGO GAZA V PRYAMOI TSILINDRICHESKOI TRUBE PRI NALICHII OKHLAZHDENIA (BEHAVIOR OF FAST MOVING FLOW OF COMPRESSIBLE GAS IN CYLINDRICAL PIPE IN PRESENCE OF COOLING), by G. A. Varshavsky. Sep 1951. 8p diagrs Microfilm $1.25, Photostat $1.25. PB 105132
For compressible flow with friction in a cylindrical pipe the momentum, continuity, and heat-transfer equations are examined to determine whether an increase in Mach number ("thermal" Laval nozzle) is obtainable through heat conduction from the gas through the pipe walls. The analysis is based on the assumption that the wall temperature is negligibly small in comparison with the stagnation temperature of the gas. The analysis leads to a negative result. When the gas cooling is increased by also considering radiation to the wall, a limited region at high temperatures is obtained where Mach number increases were theoretically possible. Obtaining this condition practically is considered impossible. Translated from Zhurnal tekhnicheskoi fiziki, v. 16, no. 4, 1946, p. 413-416. NACA TM 1274.

STATISTICAL FLUCTUATION OF INTENSITY IN EBYE-SCHERRER LINES DUE TO RANDOM ORIENTATION OF CRYSTAL GRAINS, by Hans Ekstein.

U. S. National Advisory Committee for Aeronautics. Aug 1951. 20p diagrs, table Microfilm $1.75, Photostat $2.50. PB 104972

Fluctuations of intensity are discussed for the case of line width caused by only the natural spectral width of the primary radiation and the finite size of the grains (that is, pure Fraunhofer diffraction). Mean deviation of the centroid of the intensity curve from the Bragg angle for the strongest wave length is considered as the error in measuring the line and is theoretically estimated. For a typical case (grains of 2×10^{-4} cm length and 1-sq-mm irradiated area), the error was found to be about 10 times smaller than that previously reported. NACA TN 2447.

ÜBER DAS MESSEN TURBULENTER LÄNGS- UND QUERSCHWANKUNGEN (ON THE RECORDING OF TURBULENT LONGITUDINAL AND TRANSVERSE FLUCTUATIONS), by Hans Reichardt. Aug 1951. 10p diagr, graphs Microfilm $1.25, Photostat $1.25. PB 104962

A three-wire arrangement of a hot-wire probe to be used in the measurement of nonisotropic turbulence, such as in a turbulent boundary layer, is described. A mathematical analysis of the probe's behavior is given. A typical example of the application and the results obtained with this probe are presented. Translated from Zeitschrift für angewandte mathematik und mechanik, v. 18, no. 6, December 1938, p. 358-361 by Mary H. Mahler. NACA TM 1313.

ULTRAVIOLET ABSORPTION SPECTRA OF BIOCHEMICAL SUBSTANCES AT LOW TEMPERATURES by R. L. Sinsheimer, J. F. Scott and John R. Loofbourow. Massachusetts Institute of Technology, Spectroscopy Laboratory. Oct 1949. 39p photo, diagrs, graphs, table Microfilm $2.25, Photostat $5.00. PB 105038

Various techniques for the preparation of specimens for low-temperature spectroscopy are described. Two methods employ vitrified solvents, of ether-isopentane-alcohol mixtures, or of glycerol-water mixtures. A third employs thin films prepared by sublimation in high vacuum. Thin films may also be prepared in some instances by precipitation from an evaporating solvent or by melting of the desired substance followed by rapid chilling. Spectrophotometric techniques that have been found useful for low-temperature spectroscopy are described in detail. The absorption spectra at 298°K, 77°K, and in some instances 21°K., of a variety of pyrimidine and purine compounds are presented and discussed. In general, absorption spectra of the pyrimidines exhibit considerable sharpening with development of subsidiary bands corresponding to vibrational transitions, while the absorption spectra of the purines at low temperatures are but little changed from those at room temperature. Low temperature spectroscopy appears to offer a useful tool for the characterization and differentiation of variously substituted pyrimidines in microgram quantities. Contract N5 ori-07810, Project NR-019-103. Technical report no. 4.

PSYCHOLOGY

ASCENDANT AND SUBMISSIVE MEMBERS AND LEADERS, THEIR INTERACTION IN GROUP DISCUSSION, by Elliott G. Mishler. Michigan. University. Dept. of Psychology. n.d. 35p tables Micro-, film $2.25, Photostat $5.00. PB 105372

Studies were made to test the hypothesis that ascendant members of a group are less satisfied with the group product and the leader than submissive persons under ascendant leaders, and that ascendant members are more satisfied than submissive members under submissive leaders. The Allport A-S reaction study and a forced-choice test for ascendance-submission were employed in selecting subjects. The problem assigned to the groups for discussion was relatively unstructured as regards solution; it aroused involvement on the part of the subjects and permitted the required differential behavior on the part of the leaders. Each participation was recorded on 2 precategorized observation schedules, one which focused on the problem-solving dimension of the participation and the other on the emotional meaning. An observer recorded the general discussion and described the prevailing atmosphere of the group. Ratings were made of the amount of self-oriented behavior evidenced by the subjects. The group members filled out a questionnare dealing with their satisfaction with the discussion, their liking for other members, etc. Leaders, observers, and all group members rated each member on the extent of his ascendance-submission. The experiment was designed to permit the use of analysis-of-variance technique. The selection tests attempted to measure 1 isolated segment of personality. The negative findings indicate that total personality indexes are necessary for testing the central hypothesis. The 2 persons playing the leader roles seemed to elicit differential responses regardless of the style used. A major source of satisfaction appeared within the responses of other participants to the individual. This response seemed to be the important variable within the submissive leader groups and may have negated any potential leader effect within the ascendant leader groups. The lack of coordination between the conceptual and the operational definitions precludes any decisions on the validity of the initial set of hypotheses. Contract N6 onr-232, T. O. 7.

BASIC CONSIDERATIONS AND BACKGROUND DATA CONCERNING THE FIELD CONFERENCE OBSERVATION STUDY, by Leonard Berkowitz and Jack N. Peterman. Michigan. University. Dept. of Psychology. May 1950. 23p diagrs Microfilm $2.00, Photostat $3.75. PB 105368

This study attempted to relate the events which occur before and during conferences to the end results of conferences. The work consisted of (1) isolating and defining the variables to be measured and the establishment of a theoretical structure within which these variables might operate; (2) the setting up and carrying out of carefully controlled laboratory experiments in which specific variables were carefully

investigated; and (3) the systematic observation of a large no. of real life conferences in the field and the analysis of the interrelationships between variables under field conditions. The latter project was confined to an investigation of those conferences which involved decision making and were in conjunction with the administrative and operational processes in industry, business, or government. The membership of the meeting had to be intra-organizational. The group was composed of not less than 5 and no more than 17 participants, each of whom had previously worked in meetings with each of the other members. Approximately normal distribution of some of the demographic characteristics suggests that no biasing factors operated in the selection of cases. One observer kept a running record of every participation made by each member of the group, breaking each participation down into the problem-solving categories which it included. A second observer recorded the agenda items and topics. A third observer kept a tally of evidence of several types of self-oriented needs and their satisfaction. A fourth observer sketched the seating arrangement, located and identified each participant, and recorded the no. of times each participant used I and We. At the end of the meeting each participant rated his satisfaction with the meeting, the decision and the process; the extent to which he perceived the group as a unified whole; and the degree of satisfaction with his own work in the meeting. Each observer made a series of 54 ratings in which he attempted to rate his perception of the motivational, situational, procedural, and outcome variables present in the conference. Preliminary draft of a chapter to be included as "Introduction" in a volume describing a field study of a 72 conferences in business, industry.

EXPERIMENTAL INVESTIGATION OF THE VALIDITY OF THE GROUP PROJECTION SKETCHES TEST FOR THE DESCRIPTION AND ANALYSIS OF FACE-TO-FACE GROUPS, by Milton Rosenberg and Harold Guetzkow. Michigan. University. Dept. of Psychology. Jun 1950. 28p tables Microfilm $2.00, Photostat $3.75. PB 105370

Efforts were made to determine the degree and level at which projective analysis of a group's functioning gives the same judgments as analysis based upon direct observation. Each of 10 student groups was observed by a team of 3 or 4 members during a regular scheduled meeting. Observers worked up ratings on 12 dimensions of group function and wrote a qualitative description and analysis of the group. Each group took both the Group Projection Sketches (G.P.S.) test (Henry, W. and Guetzkow, H., J. Soc. Psychol., 1950) and a dot test (both individual and group estimation of no. of dots on a card). An individual, working from the G.P.S. protocols, rated on the same 12 scales as the observers and also wrote a qualitative group characterization. Correlation of the projective and observational data failed to confirm either the validity or nonvalidity of the G.P.S. test. New orientations were gained as to the kinds of factors (many of which are discussed) which must be accounted for both empirically and theoretically before a valid group-projective device can be perfected.

EXPERIMENTAL STUDY OF AUDITORY PATTERNS, by George A. Heise and George A. Miller. Harvard University. Psycho-Acoustic Laboratory. n.d. 18p graphs, table Microfilm $1.75, Photostat $2.50. PB 105252

The threshold frequency for the perceptual integration of a variable tone into a temporal sequence of tones was measured as a function of the shape of the sequence and the ratio of the frequencies of successive tones. Six different frequency ratios between successive tones in the sequence were investigated for each of 4 pattern type: inverted V, upright V, ascending straight line, and descending straight line. For each combination of pattern and frequency ratio between successive tones, the subjects made upper settings of the variable tone, for which increasing the frequency of the variable tone caused it to separate from the remainder of the sequence, and lower settings, for which decreasing the frequency of the variable tone caused it to separate from the remainder of the sequence. The results with these auditory stimuli are in general agreement with the principles of visual perceptual organization. Thresholds for inclusion of a tone in a pattern are determined in part by the type of pattern. The subject's settings of the variable tone are influenced not only by the tones that precede the variable tone but also by tones that follow the variable tone, or that precede the variable tone by a temporal interval filled with other tones. The steepness, or magnitude of the ratios of frequencies of successive tones of the sequence affects the threshold. The difference between the frequency of the tone immediately preceding the variable tone and the frequency of the variable tone as set by S generally increases as the steepness of the sequence increases, unless counteracted by a specific influence of the pattern type. Contract N5ori-76, Project order II, NR147-201. PNR 92.

PSYCHOLOGICAL STUDIES OF TRACKING BEHAVIOR. PART III: CHARACTERISTICS OF QUICK MANUAL CORRECTIVE MOVEMENTS MADE IN RESPONSE TO STEP-FUNCTION VELOCITY INPUTS, by M. L. Young. U. S. Naval Research Laboratory. Aug 1951. 10p drawing, graphs Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $.25. PB 105299

An investigation has been conducted of the characteristics of quick manual corrective responses made to a visual target moving at a preset constant velocity. Visual errors of 2, 4, 8, and 16 degrees per second to the right and left were presented to 10 subjects in a predetermined irregular order. These errors were corrected through the movement of a joystick. The joystick responses were analyzed electronically into time plots of position, rate, acceleration, and the third derivative of position (Δ acceleration). In general, the results obtained were similar to those found by other investigators studying the characteristics of responses to step-function position displacements of the target. The amplitude, rate, and acceleration (or force) of the response movements increased systematically as the velocity of the target increased. This resulted in all response motions being made in approximately the same amount of time regardless of the distance moved. The major difference between the findings of the present study and of previous investigations of responses to target displacements was the decrease in reaction time with increases in presented stimulus velocity. This result is believed due to the particular motiva-

tional and perceptual aspects of the present experimental situation. Although the response situation in the present study appears to be more complex than that in which step-function position errors are studied, due to the continued movement of the target during the reaction and response time, the response movements appear to be executed in a similar manner in both cases. That is, the response is released as a unit at the end of the reaction time and once started runs its course to completion unmodified by visual information arising during the course of the movement. NRL R 3850.

RELIABILITY OF METHODS OF DATA COLLEC TION, by Nicholas T. Fouriezos and Roger W. Heyns. Michigan. University, Ann Arbor, Mich. 1950? 27p tables Microfilm $2.00, Photostat $3.75. PB 105361

Specially trained observers were used to study the conference behavior of 72 business and government groups. Each observer rated aspects of the total behavior of the group and made observations and recordings in an area for which he had been specially trained. The data indicate that well-trained observers can agree on their ratings of group frustration, no. of cliques, and opportunity to communicate, observers can be reliably employed in categorizing the problem-solving process, observing the extent of self-oriented need behavior, and observing the conference from the standpoint of content. Participants are reliable sources of data for aspects of conference process, both for reports obtained in interview and for responses made on rating scales immediately after the meeting. Preliminary draft of a chapter to be included in a volume describing a study of 72 business and Government group.

RESEARCH AND DEVELOPMENT TECHNICAL PROGRESS REPORT, 30 JUNE, 1951. U. S. Adjutant General's Office. Personnel Research Section. Jun 1951. 120p Microfilm $4.75, Photostat $15.00. PB 105151

1. Psychology, Applied 2. Personnel, Military 3. Psychological research.

ROLE OF HUMAN ENGINEERING IN NATIONAL DEFENSE: RECOMMENDATIONS FOR INCREASED EFFECTIVENESS. U. S. Research and Development Board. Committee on Human Resources. May 1951. 13p Microfilm $1.75, Photostat $2.50. PB 104716

1. Psychology, Applied.

Prepared by the Panel on Human Engineering and Psychophysiology. HPS 107/1.

TRAINING OPPORTUNITIES IN THE CONFERENCE RESEARCH PROJECT SUPPORTED BY A GRANT FROM THE CARNEGIE FOUNDATION FOR YEARS 1948/49 AND 1949/50. Michigan. University. Dept. of Psychology. n.d. 5p Microfilm $1.25, Photostat $1.25. PB 105369

Graduate students during 1948-49 advanced considerably toward professional skills in social psychology and in acquiring skill in working as a member of a research team. Staff members gained experience in training graduate students in a research setting. This experience suggests that: (1) For optimum training in a research setting 1 staff member should be designated as responsible for training. (2) More people can be given experience at the higher academic levels for the same amount of money, but the caliber of the training director must be higher than with the younger graduate students. The grant for 1949-50 enabled 3 graduate students to develop skills necessary for the successful completion of a doctoral dissertation and a fourth to acquire post-doctoral experience in independent research. The value of the post-doctoral training may exceed the value of training opportunities at earlier stages. The training of graduate students at the doctoral level in a research project can have added value for the student and the project if the dissertation chairman is not a member of the research project staff. This arrangement prevents what might otherwise be an exclusive exposure to the theoretical position, methods, and procedures of the project.

RUBBER AND RUBBER PRODUCTS

CORRESPONDENCE AND LABORATORY REPORTS RELATING TO TESTS ON BUNA PRODUCTS. I. G. Farbenindustrie A. G., Schkopau, Ger. 1941-1945. 897f drawings (Text in German) Microfilm $9.00, Enlargement Print $117.50. PB 99923

1. Rubber, Buna - Tests - Germany 2. Micro BIOS FD 2391/47, Frames 888-18.

English abstract available as PB 99923s. 1p. Microfilm $1.25, Photostat $1.25.

STRUCTURAL ENGINEERING

EARTHQUAKE RESISTING STRUCTURES, by Edward R. Dye. Montana. Engineering Experiment Station, Bozeman, Montana. Jan 1936. 43p photos, drawings Available from The Director, Montana State College, Bozeman, Montana. PB 105180

1. Buildings - Construction - Earthquake resistant.

University of Montana bulletin, State College series no. 100. Engineering Experiment Station bulletin no. 1.

THE NAIL, AN INDISPENSABLE FASTENER, by E. George Stern. Virginia Polytechnic Institute. Wood Research Laboratory, Blacksburg, Va. Aug 1951. 15p photos, tables Available from The Director, Virginia Polytechnic Institute, Blacksburg, Va. PB 105182

1, Nails.

RADIANT BASEBOARD HEATING AND EFFECTS OF REDUCED THERMOSTAT SETTING AND OPEN BEDROOM WINDOWS AT NIGHT, by Warren S. Harris and Robert H. Weigel. Illinois. Engineering Experiment Station, Urbana, Ill. Jul 1951. 66p photo, drawings, diagrs, graphs, tables Available from Engineering Experiment Station, University of Illinois, Urbana, Ill. $.70. PB 105164

1. Heat, Radiant 2. ILU EES B391.

Investigation conducted in cooperation with the Institute of Boiler and Radiator Manufacturers.

RESISTANCE OF MATERIALS TO MECHANICAL SHOCK, by B. Goldberg and T. E. Pardue. U. S. Naval Research Laboratory. Jul 1951. 28p photos, graphs, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $.75. PB 105301

A study has been continued of apparatus for evaluating relative shock resistance of materials and the factors which determine shock resistance. In this study, the properties of materials are considered to be characterized by their ability to withstand a relatively small number of strain cycles involving large plastic deformations. Shock motions similar to those obtained in the field were provided by a Taft-Peirce High-Impact Machine for Electronic Devices. It was tentatively concluded that this machine or any other device designed to measure energy absorption can provide a dependable evaluation of relative shock resistance. However, the most reliable data can be determined from a dynamic test involving repeated shock loads. Ductility and ability to absorp energy under repeated loadings are among the more significant factors in shock resistance. Comparisons between shock data and other mechanical test data show the common mechanical properties to be inadequate criteria of shock resistance. NRL R 3828.

WOOD BOX COLUMNS AND THEIR DESIGN, by B. Y. Kinzey, Jr. Virginia. Engineering Experiment Station. Jul 1951. 24p photos, diagrs, graphs, tables Available from Virginia Polytechnic Institute, Engineering Experiment Station, Blacksburg, Va. $.25. PB 104627

1. Beams, Box - Design 2. Beams, Box - Compression tests 3. Beams, Box - Stress analysis 4. VEES no. 79.

Bulletin of the Virginia Polytechnic Institute, vol. XLIV, no. 5. Part of this bulletin was published in Civil Engineering and Public Works Review (London) Jan-Mar 1951.

TEXTILES AND TEXTILE PRODUCTS

LABORATORY EVALUATION OF THE WEAR RESISTANCE ON NONWOVEN FABRICS, by R. G. Stoll. U.S. Office of the Quartermaster General. Military Planning Division. Research and Development Branch. Jan 1951. 20p photos, drawings, graph, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.50 PB 104795

The nature of the breakdown of nonwoven fabrics by complex mechanical wear actions is discussed. Flex abrasion and surface abrasion under dry and wet conditions are considered to be critical actions in service wear. Test procedures for measuring resistance to these actions by means of a new instrument are described and the results obtained on four bonded fiber webs are used to demonstrate the relative precision of the methods and their capacity to predict wear resistance in general. QMC TSR 65.

TRANSPORTATION EQUIPMENT

Aeronautics

Aircraft

AILERON TESTS ON A SPITFIRE, by D. E. Morris and M. B. Morgan, with an appendix by F. Grinsted. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Apr 1941. 11p drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.65. PB 104409

1. Spitfire (Airplane) 2. Ailerons - Tests - Gt. Brit. 3. ARC RM 2507.

Cover date is 1951. S. O. Code no. 23-2507.

CALCULATION OF THE INTERFERENCE ON A THIN SYMMETRICAL AEROFOIL WITH HINGED FLAP SPANNING A CLOSED WIND-TUNNEL, by J. H. Preston and A. R. Manwell. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Oct 1941. 14p diagrs, graphs Available from British Information Service, 30 Rockefeller Plaza, New York 20, N.Y. $1.00. PB 104746

1. Airfoils, Symmetrical - Thin - Interference - Gt. Brit. 2. Wind tunnels, Closed - Hinged flaps - Gt. Brit. 3. ARC RM 2465.

Cover date is 1951. S. O. Code no. 23-2465.

CALIBRATION OF THE ROYAL AIRCRAFT ESTABLISHMENT 24-FT WIND TUNNEL, by J. E. Allen and K. V. Diprose. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jun 1942. 17p photos, diagrs, graphs, tables (1 fold) Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.90. PB 104412

1. Wind tunnels - Calibration - Gt. Brit. 2. Gt. Brit. Royal Aircraft Establishment, Farnborough, England 3. ARC RM 2566.

Cover date is 1951. S. O. Code no. 23-2566.

COCKPIT LIGHTING: GENERAL SURVEY OF THE PRINCIPLES AND TECHNIQUES, WITH PARTICULAR REFERENCE TO THE DEVELOPMENT OF THE DUAL SYSTEM, by E. S. Calvert. Gt. Brit. Ministry of Supply. Aeronautical Research Council. 1946. 39p photos, diagrs, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.25. PB 103693

1. Cockpits - Lighting - Gt. Brit. 2. Gt. Brit. Royal Aircraft Establishment, Farnborough, England 3. ARC CP 36.

Cover date is 1951. S. O. Code no. 23-9006-36.

CREW WORK SPACES IN RB-45 AND B-50D TYPE AIRPLANES, by Gilbert S. Daniels. U. S. Air Develop-

ment Force. Research Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. May 1951. 4p Microfilm $1.25, Photostat $1.25. PB 104595

1. RB45 (Airplane) 2. B-50D (Airplane) 3. Airplanes - Design - Safety factors 4. AAF TSEAA MR 695-20L.

DCRDB-695-20L.

CURRENT PERSONAL EQUIPMENT AND ESCAPE PROBLEMS IN THE FEAF, by Henry M. Sweeney and Vincent Mazza. U. S. Air Materiel Command. Engineering Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Chio. Mar 1951. 24p Microfilm $2.00, Photostat $3.75. PB 104596

1. Pilots, Air - Equipment 2. Airplanes - Safety devices and measures 3. Kits, Aircraft - Survival 4. AAF TSEAA MR 695-66N.

MCREXD-695-66N.

EFFICIENCY OF AIRSCREWS ON WINGS OF LARGE CHORD, by E. Ower and R. Warden. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Mar 1939. 18p diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.25. PB 104745

1. Propellers, Wing - Gt. Brit. 2. Wings - Structure - Gt. Brit. 3. Nacelles Engine - Wings - Gt. Brit. 4. ARC RM 2438.

Cover date is 1951. S. O. Code no. 23-2438.

EXPERIMENTAL INVESTIGATION OF THE EFFECT OF LOCALISED MASSES ON THE FLUTTER OF A MODEL WING, by N. C. Lambourne and D. Weston. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Apr 1944. 28p photos, diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.25. PB 104747

This report contains an account of some experiments on the effect of concentrated masses (representing wing engines, etc.) on the flutter characteristics of a model cantilever wing. Flutter critical speeds and frequencies were measured for an extensive range of mass loading and the results are presented in the form of diagrams. The flutter motions for a few representative conditions of mass loading were determined by an analysis of cinematograph pictures. The results of experiments on the influence of the flexibility of an engine mounting are also included. Cover date is 1951. S. O. Code no. 23-2533. ARC RM 2533

EXPERIMENTS ON AIR FLOW IN THE 7-FOOT OPEN-JET NO. 1 WIND-TUNNEL AND APPLICATION TO WIND-TUNNEL DESIGN, by V. M. Falkner and H. L. Nixon. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jan 1944. 10p photo, diagrs, drawings Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.50. PB 104407

1. Wind tunnels - Jet effect - Gt. Brit. 2. Wind tunnels - Design - Gt. Brit. 3. Jet propulsion units - Wind tunnel tests - Gt. Brit. 4. Wind tunnel tests - Gt. Brit. 5. ARC RM 2484.

Cover date is 1951. S. O. Code no. 23-2484.

EXPERIMENTS ON THE BALANCING OF AILERONS BY GEARED TABS AND TRAILING-EDGE STRIPS, AND APPENDIX, by L. W. Bryant, C. H. Burge, N.E. Sweeting and J. R. Greening. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Apr 1941. 29p drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.25. PB 104410

1. Ailerons - Balance - Gt. Brit. 2. Tabs, Control - Tests - Gt. Brit. 3. Ailerons - Trailing edges - Gt. Brit. 4. ARC RM 2510.

Cover date is 1951. S. O. Code no. 23-2510.

FLIGHT INVESTIGATION OF SOME FACTORS AFFECTING THE CRITICAL TAIL LOADS ON LARGE AIRPLANES, by Harvey H. Brown. U. S. National Advisory Committee for Aeronautics. Sep 1951. 119p photos, diagrs, graphs, tables Microfilm $4.75, Photostat $15.00. PB 104993

Measurements were made of the control motions and control forces during maneuvers regarded as likely to produce critical tail loads. The pitching motion of the airplane agreed well with that calculated, provided the equation of motion was not overly simplified. Structural deflections measured during the maneuvers proved to be small. It was found that pilots were inclined to allow the controls to return to neutral at a higher rate than obtained in the initial deflection, producing tail loads of which they had no physical awareness. NACA TN 2490.

FLIGHT INVESTIGATION OF THE EFFECT OF TRANSIENT WING RESPONSE ON WING STRAINS OF A TWIN-ENGINE TRANSPORT AIRPLANE IN ROUGH AIR, by Harry C. Mickleboro and C. C. Shufflebarger. U. S. National Advisory Committee for Aeronautics. Jul 1951. 21p diagrs, graphs, tables Microfilm $2.00, Photostat $3.75. PB 104652

The results of a flight investigation on a twin-engine transport airplane to determine the effect of transient wing response on wing strains show that the bending strains per unit normal acceleration in gusts were approximately 20 percent higher than those in slow pull-ups for all measuring positions and flight conditions of the tests. The data for the spar web strain exhibited a rather large amount of scatter, and the web strains per unit normal acceleration in gusts relative to those in pull-ups varied considerably with measuring station. NACA TN 2424.

FLIGHT MEASUREMENTS OF PROFILE DRAG AT HIGH SPEEDS, by W. A. Mair. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jul 1942. 11p diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.65. PB 103688

Using a pitot-traverse method, the profile drag of an 18 per cent thick wing section has been measured, both in level flight and in dives, at Mach numbers up to about 0.7. The pressures in the wake were measured by means of air-speed indicators and recorded photographically. At the theoretical critical speed of the wing (M = 0.66), the increase of profile-drag coefficient due to compressibility is about 8 per cent. At higher speeds the drag coefficient increases rapidly with Mach number. Cover date is 1951. ARC RM 2555.

FLIGHT TESTS OF A YOUNGMAN FLAP ON FAIREY P.4/34. K.7555, by M. B. Morgan and D. E. Morris. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jun 1941. 14p photos, drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.75. PB 103936

1. Fairey P.4/34K.7555 (Airplane) 2. P.4/34K.7555 (Airplane) 3. Flaps, Aircraft - Tests - Gt. Brit. 4. Fairey Aviation, Ltd. 5. ARC RM 2547.

Cover date is 1951. S. O. Code no. 23-2547.

FUNDAMENTALS OF FLUTTER, by W. J. Duncan. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Nov 1948. 36p photo, diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.50. PB 104399

The primary aim of the paper is to present a rational and easily understood account of flutter to non-expert readers. Part I is entirely non-mathematical and complete in itself. Emphasis is placed on explaining the physical mechanism of flutter, and the discussion is illustrated by reference to experiments with the "flutter engine" in an air stream. This engine consists of a rigid aerofoil which can oscillate in pitch about a spanwise axle while in this axle can oscillate in roll about a fixed axis at the root of the aerofoil. The pitching and rolling oscillations are produced by suitable linkage to a pair of cranks on a single shaft, so arranged that the angle between the cranks for rolling and pitching can be varied at will. In this way the phase difference between the pitching and rolling oscillations can be changed and the profound effect of this on the stability demonstrated. Elementary discussions of flutter prevention and of wing divergence are included in Part I. An elementary account of the theory of flutter is presented in Part II, and most of the mathematical details are given in three Appendixes. The subjects of these are phase and amplitude relations in flutter, the test function for stability and the energy account. Cover date is 1951. S. O. Code no. 23-2417. ARC RM 2417.

FURTHER WIND TUNNEL TESTS ON THE EFFECTS OF ICE ACCRETION ON CONTROL CHARACTERISTICS, by A. Spence. Gt. Brit. Ministry of Supply. Aeronautical Research Council. May 1950. 12p drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.40. PB 104697

1. Wind tunnel tests - Gt. Brit. 2. Airplanes - Controls - Gt. Brit. 3. Airplanes - Icing - Gt. Brit. 4. Airplanes - Models - Tests - Gt. Brit. 5. Tail surfaces - Icing - Gt. Brit. 6. Model testing - Gt. Brit. 7. Gt. Brit. Royal Aircraft Establishment, Farnborough, England 8. ARC CP 43.

Technical note no. Aero. 2048. Cover date is 1951. S. O. Code no. 23-9006-43.

FURTHER WIND-TUNNEL TESTS ON THE SUPERMARINE S. 12/40, A MONOPLANE AMPHIBIAN WITH A VARIABLE INCIDENCE WING, by H. V. Becker, R. Hills and H. Hogg. Gt. Brit. Ministry of Supply. Aeronautical Research Council. May 1944. 14p diagrs, drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.75. PB 104403

1. Aircraft, Amphibious - Tests - Gt. Brit. 2. Airplanes - Models - Tests - Gt. Brit. 3. Model testing - Gt. Brit. 4. Wings, Variable-incidence - Gt. Brit. 5. Wind tunnel tests - Gt. Brit. 6. Supermarine S.12/40 (Monoplane) 7. S.12/40 (Monoplane) 8. ARC RM 2455.

See also PB 104402. Cover date is 1951. S. O. Code no. 23-2455.

HANDLING AND PERFORMANCE REPORT CANADAIR C-5, by J. H. Phillips and M. T. Friedl. Canada. Royal Canadian Air Force. Experimental and Proving Establishment, Rockcliffe, Canada. Jan 1951. 25p graphs, tables Microfilm $2.00, Photostat $3.75. PB 104444

1. Airplanes - Performance - Canada 2. Canadair C-5 (Airplane) 3. RCAF EPE 973.

Cover date is June 1951. RCAF development report: Final D171/1. Reference: AFHQ Signal TS33 (D/AMTS/D) dated 27 June 1950. Issued by AMTS.

IMPROVEMENT OF THE CODING OF NAVAL AIRCRAFT ACCIDENT REPORTS, by Willis C. Schaefer, Harry J. Older, Robert Long. Institute for Research in Human Relations, Washington, D. C. Aug 1951. 35p Microfilm $2.25, Photostat $5.00. PB 104692

1. Codes, Aeronautical 2. Airplanes - Accidents - Statistics 3. U. S. Bureau of Medicine and Surgery. Division of Aviation Medicine 4. NRC CAP no. 15.

Report on research conducted by the Institute for Research in Human Relations under the auspices of the National Research Council Committee on Aviation psychology under Task order IX, Contract no. N7onr-291, in cooperation with the Flight Safety and Statistics Branch of DCNO Air and the Division of Aviation Medicine, Bureau of Medicine and Surgery, U. S. Navy, with funds provided through the Office of Naval Research.

INSTRUMENTATION OF A NORTH STAR AIRCRAFT FOR STABILITY, CONTROL AND PERFORMANCE MEASUREMENTS, by L. C. Pingel. Canada. Royal Canadian Air Force. Experimental and Proving Establishment, Rockcliffe, Canada. Mar 1948. 38p photos, drawings, graphs, tables Microfilm $2.25, Photostat $5.00. PB 104445

1. North Star (Airplane) 2. Airplanes - Controls - Canada 3. Airplanes - Performance - Canada 4. Airplanes - Stability - Canada 5. RCAF EPE 978.

Cover date is June 1951. RCAF development report: Final D1-2. Reference: AMTS directive 1/48 dated 2 March 1948. Issued by AMTS.

INVESTIGATION OF AIRCRAFT HEATERS. XXXIV: EXPERIMENTAL DETERMINATION OF THERMAL AND HYDRODYNAMICAL BEHAVIOR OF AIR FLOWING BETWEEN A FLAT AND A WAVE-SHAPED PLATE, by L.M.K. Boelter, V. D. Sanders, G. Young, M. Morgan and E. H. Morrin. U. S. National Advisory Committee for Aeronautics. Aug 1951. 30p diagr, graphs, table Microfilm $2.00, Photostat $3.75. PB 104861

Investigation was conducted on thermal and hydrodynamical behavior of air flowing along a passage of

which one side was flat and steam-heated and the other side was wave-shaped and unheated. Turbulence produced by air flowing over wavy surfaces approximately doubles heat-transfer rate for narrow duct widths. At large duct widths, the effect is negligible. Pressure drop was greatly increased over that for a straight duct. Pressure drop was increased to at least 4 times for large duct widths and to at least 10 times for small duct widths. NACA TN 2426.

INVESTIGATION OF AIRCRAFT HEATERS. XXV: THERMOCOUPLE CONDUCTION ERROR OBSERVED IN MEASURING SURFACE TEMPERATURES, by L.M.K. Boelter and R. W. Lockhart. U. S. National Advisory Committee for Aeronautics. Jul 1951. 34p photo, diagr, graphs, table Microfilm $2.25, Photostat $5.00. PB 104691

Errors in measuring the temperature of a plate in an air stream due to heat transfer between stream and plate along the thermocouple wires are experimentally investigated and analytically predicted. Electrical insulation has little effect on the thermocouple error, but the error is reduced if the wires are in thermal contact with the plate for 4 inches before passing through the fluid. NACA TN 2427.

INVESTIGATION OF AIRCRAFT HEATERS. XXXVI: PRELIMINARY INVESTIGATION OF A COMBUSTION-TYPE AIRCRAFT HEATER, by L.M.K. Boelter, W. R. Elswick, V. D. Sanders and M. W. Rubesin. U. S. National Advisory Committee for Aeronautics. Aug 1951. 15p drawings, graphs Microfilm $1.75, Photostat $2.50. PB 104862

Experimental results on the thermal performance of an aircraft combustion-type heater are presented. Evaluation of the thermal effectiveness of the heater reveals that the effects of gaseous radiation and turbulence due to combustion are negligible. NACA TN 2428.

INVESTIGATION OF NACA 64,2-432 AND 64,3-440 AIRFOIL SECTIONS WITH BOUNDARY-LAYER CONTROL AND AN ANALYTICAL STUDY OF THEIR POSSIBLE APPLICATIONS, by Elmer A. Horton, Stanley F. Racisz and Nicholas J. Paradiso. U. S. National Advisory Committee for Aeronautics. Jul 1951. 40p photos, diagrs, graphs, tables Microfilm $2.25, Photostat $5.00. PB 104535

An investigation was made to determine the effect of boundary-layer control by means of suction through a slot at 0.60c on the pressure distribution, lift, and drag characteristics of the NACA 64,2-432 and 64, 3-440 airfoil sections. The effect on the section aerodynamic characteristics of boundary-layer control by means of a slot at 0.50c and by means of area suction from 0.55c to 0.71c was also investigated for the NACA 64,3-440 airfoil. An analysis was made to show the effect of such thick airfoil sections and boundary-layer control on the lift-drag ratio of a wing. The section data presented and employed in the analysis were obtained with standard roughness applied to the leading edges of the models. This roughness was probably more severe than that likely to be encountered on practical aircraft under normal operating conditions; therefore, the drag coefficients measured both with and without boundary layer control may be somewhat high as compared with practical flight values. NACA TN 2405.

NOTE ON THE PRESSURE DROP CHARACTERISTICS OF BAFFLES FOR USE IN WIND-TUNNEL MODEL TESTS OF COOLING DUCT SYSTEMS, by J. Seddon and A. Spence. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Apr 1944. 10p diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.50. PB 104400

The report describes the pressure drop characteristics of various forms of baffle used in wind-tunnel model tests of cooling duct systems. It is concerned mainly with baffles representing radiators (i.e. coolant radiators, intercooler radiators, oil coolers). Details are given of some recent calibrations. The result show that in the usual range of Reynolds number for model tests scale effect on the pressure drop is small. A collection of data is made which shows that the baffle constant of a plate or block with sharp-edged apertures can be calculated using a drag coefficient of 1.5 based on the blocked area and the mean velocity in the apertures. Thin circular orifice plates are an exception to this; they appear to have higher baffle constants than other types. Tests are described comparing results with various baffles in a duct having a non-uniform distribution of flow. It is concluded that a slotted plate or drilled block gives adequate representation for most practical purposes. The available data on baffles representing air-cooled engines are briefly reviewed. Cover date is 1951. S. O. Code no. 23-2425. ARC RM 2425.

ON THE USE OF COUPLED MODAL FUNCTIONS IN FLUTTER ANALYSIS, by Donald S. Woolston and Harry L. Runyan. U. S. National Advisory Committee for Aeronautics. Jun 1951. 13p graphs, tables Microfilm $1.75, Photostat $2.50. PB 104054

An investigation of the flutter characteristics of a uniform, unswept, cantilever wing of high aspect ratio and under conditions of high mass coupling has been made by means of an analysis of the Rayleigh type based on coupled modal functions. Results are compared with those of an analysis based on uncoupled modes and with experiment. For the configuration studied, the use of coupled modes was found to yield, in general, no better agreement with experiment than did the use of uncoupled modes. NACA TN 2375.

PITOT-TUBE READINGS NEAR SHOCK WAVES IN THE N.P.L. AND R.A.E. HIGH SPEED TUNNELS, by R. G. Fowler. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Feb 1945. 13p photos, diagrs, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.75. PB 104405

1. Pitot-static tubes - Wind tunnel tests - Gt. Brit. 2. Shock waves - Pressure - Gt. Brit. 3. Wind tunnels, High speed - Air conditions - Gt. Brit. 4. Wind tunnel tests - Gt. Brit. 5. Airfoils - Wind tunnel tests - Gt. Brit. 6. Gt. Brit. Royal Aircraft Establishment, Farnborough, England 7. Gt. Brit. National Physical Laboratory 8. ARC RM 2468.

Cover date is 1951. S. O. Code no. 23-2468.

REZONANSNYI ZVUKOPOGLOTITEL'S PODIATLIVOI STENKOI (RESONANCE SOUND ABSORBER WITH YIELDING WALL), by S. N. Rzhevkin. May 1951. 26p diagrs, graphs Microfilm $2.00, Photostat $3.75. PB 103918

A single-sheet resonance system for normal incidence of sound was investigated to study in detail the effect of sympathetic vibration of the resonator front wall on sound absorption. Translated from Zhurnal teckhnicheskoi fiziki vol. XVI, no. 4, 1946, p. 381-394. NACA TM 1273.

RIB LOADS AT CHANGES OF SECTION IN A TORSION BOX, BY D. WILLIAMS, WITH AN APPENDIX CONTAINING AN EXTENSION OF THE WORK TO THE CASE OF A STIFF END RIB, by H. G. Hopkins. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jun 1945. 8p diagrs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.50. PB 104408

1. Boxes, Torsion - Structural testing - Gt. Brit. 2. Torsion balances - Gt. Brit. 3. Wings - Span load distribution - Gt. Brit. 4. Ribs, Wing - Loads - Gt. Brit. 5. ARC RM 2503.

Cover date is 1951. S. O. Code no. 23-2503.

RESEARCH WORK IN AIRCRAFT STRUCTURES, by P. B. Walker. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Mar 1947. 13p tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.65. PB 104397

1. Aircraft - Structures - Research - Gt. Brit. 2. ARC RM 2327.

Cover date is 1951. S. O. Code no. 23-2327.

WING FLEXURE-AILERON FLUTTER TESTS ON A MODEL OF B.A.C. WING TYPE 167, by G. Scruton. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Oct 1944. 19p photo, drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.25. PB 104695

1. Wings - Flutter - Gt. Brit. 2. Ailerons - Controls - Tests - Gt. Brit. 3. Wings - Model test - Gt. Brit. 4. Model testing - Gt. Brit. 5. B.A.C. wing type 167 6. 167 (B.A.C. wing type) 7. ARC RM 2480.

Part I. Effect of a proposed gust alleviating aileron system. p. 1-7. - Part II. Range and purpose of investigation. p. 8-17. Cover date is 1951. S. O. Code no. 23-2480.

WIND TUNNEL TESTS ON A GRIFFITH METEOR MODEL (WITHOUT SUCTION), by D. A. Clarke. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Nov 1946. 18p drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.65. PB 103694

1. Griffith Meteor (British airplane model) 2. Wind tunnel tests - Gt. Brit. 3. ARC CP 37.

Cover date is 1951. S. O. Code no. 23-9006-37.

WIND-TUNNEL TESTS ON THE FOLLAND E.28/40 HIGH-WING MONOPLANE WITH A VARIABLE-INCIDENCE WING, BY STAFF OF THE ROYAL AIRCRAFT ESTABLISHMENT. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jan 1944. 63p diagrs, graphs, drawings, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $2.50. PB 104404

1. Folland E. 28/40 (Monoplane) 2. E.28/40 (Monoplane) 3. Airplanes - Models - Tests - Gt. Brit. 4. Model testing - Gt. Brit. 5. Wings, Variable-incidence - Gt. Brit. 6. Wind tunnel tests - Gt. Brit. 7. Gt. Brit. Royal Aircraft Establishment, Farnborough, England 8. ARC RM 2456.

Cover date is 1951. S. O. Code 23-2456. Contents: - Part I. by R. Hills, R. H. Whitley, and F. N. Kirk. p. 3-26. - Part II. Further wind-tunnel tests on the Folland E.28/40-without ground, by E. Priestley, H. V. Becker and E. C. Brown. p. 27-42. - Part III. Further wind tunnel tests on the Folland E.28/40 - with ground, by H. V. Becker, R. L. Jefferies and M. A. Morrison. p. 43-63.

WIND-TUNNEL TESTS ON THE SUPERMARINE S.12/40, A MONOPLANE AMPHIBIAN WITH A VARIABLE INCIDENCE WING, by H. V. Becker, R. Hills and M. A. Morrison. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jun 1943. 35p diagrs, drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.50. PB 104402

1. Aircraft, Amphibious - Tests - Gt. Brit. 2. Airplanes - Models - Tests - Gt. Brit. 3. Model testing - Gt. Brit. 4. Wings, Variable-incidence - Gt. Brit. 5. Supermarine S.12/40 (Monoplane amphibian) 6. S.12/40 (Supermarine monoplane amphibian) 7. Wind tunnel tests - Gt. Brit. 8. ARC RM 2454.

See also PB 104403. Cover date is 1951. S. O. Code no. 23-2454.

Instruments

ANALYSIS OF PURE-BENDING FLUTTER OF A CANTILEVER SWEPT WING AND ITS RELATION TO BENDING-TORSION FLUTTER, by H. J. Cunningham. U. S. National Advisory Committee for Aeronautics. Sep 1951. 24p diagrs Microfilm $2.00, Photostat $3.75. PB 104979

An analytical investigation of flutter in bending alone of a cantilever swept wing and the relation of such bending-alone flutter to coupled flutter is reported. The analysis is made on the basis of certain simplifying assumptions, including that each wing section is affected aerodynamically as if it is in a two-dimensional flow, for both compressible and incompressible flow. Some quantitative effects of wing mass-density ratio and sweep parameter, required to enable single-degree bending flutter, are presented, as are results of speed and frequency of single-degree and related coupled flutter. The effect of compressibility on characteristics of single-degree and related coupled flutter is predicted to be marked for a normal-component Mach number of 0.7. NACA TN 2461.

ANALYTICAL INVESTIGATION OF EFFECT OF HIGH-LIFT FLAPS ON TAKE-OFF OF LIGHT AIRPLANES, by Fred E. Weick, L. E. Flanagan, Jr., and H. H. Cherry. U. S. National Advisory Committee for Aeronautics. Sep 1951. 101p diagrs, graphs,

tables Microfilm $4.50, Photostat $13.75.
PB 104964

An analytical study was made to determine the effects of high-lift devices on the take-off characteristics of light airplanes. Three phases of the problem of improving take-off performance by the use of flaps were considered. The optimum lift coefficient for take-off was determined for airplanes having loadings representative of light aircraft and flying from field surfaces encountered in personal-aircraft operation. Existing high-lift and control-device data were studied and compared to determine which combinations of such devices appeared to offer the most suitable arrangements for light aircraft. Computations were made to verify that suitable stability, control, and performance can be obtained when the optimum devices selected are applied to a specific airplane. NACA TN 2404.

EMPIRICAL METHOD PERMITTING RAPID DETERMINATION OF THE AREA, RATE, AND DISTRIBUTION OF WATER-DROP IMPINGEMENT ON AN AIRFOIL OF ARBITRARY SECTION AT SUBSONIC SPEEDS, by Norman R. Bergrun. U. S. National Advisory Committee for Aeronautics. Sep 1951. 151p diagrs, graphs, tables Microfilm $6.00, Photostat $20.00. PB 104981

A method is developed which permits the determination of area, rate, and distribution of water-drop impingement on airfoils of arbitrary section as subsonic speeds. The method, which is based on the results of extensive water-drop-trajectory calculations for five airfoil cases, requires only a few simple numerical computations once the velocity distribution over the airfoil has been determined. NACA TN 2476.

FURTHER COMPARISONS OF THEORETICAL AND EXPERIMENTAL LIFT AND PRESSURE DISTRIBUTIONS OF AIRFOILS IN CASCADE AT LOW-SUBSONIC SPEED, by S. Katzoff and Margery E. Hannah. U. S. National Advisory Committee for Aeronautics. Aug 1951. 24p diagrs, graphs Microfilm $2.00, Photostat $3.75. PB 104963

Comparisons of theoretical and experimental lift coefficients and pressure distributions were made for five compressor-type cascades of highly cambered NACA 6-series airfoils. The experimental lift coefficients were 0.2 to 0.4 less than the theoretical for the same mean-flow direction. When the theoretical lift was made equal to the experimental lift by simply adjusting the circulation to the desired value, the Kutta condition being neglected, close agreements were obtained between the pressure distributions. The data (low-speed) were obtained by the newer technique of NACA TN 2028, and the comparisons are substantially better than those previously reported in NACA TN 1376. NACA TN 2391.

INVESTIGATIONS IN AERONAUTICS, R. M. Rosenberg, Editor. Washington. University, Dept. of Aeronautical Engineering, Seattle, Washington. 1951. 117p photos, drawings, diagrs, graphs Available from Engineering Experiment Station, University of Washington, Seattle, Washington. $2.00. PB 105001

1. Aeronautics - Research 2. Karman-Tsien method 3. Boundary layer, Laminar 4. Gases, Rarified - Thermal conductivity 5. Gases, Rarified - Viscosity 6. Struts, Oleo - Pins - Design 7. Ailerons - Flutter 8. Equations, Differential 9. Bearings - Effect of axial torque 10. Struts, Cantilever - Stability 11. Plates, Cantilever - Deflection 12. Torsion 13. WEES B118.

Contents: I. Application of the extended Karman-Tsien method for the generation of conventional airfoils in two-dimensional subsonic compressible flow, by Richard M. Marks. - II. The flat plate laminar boundary layer in a steady accelerated compressible fluid, by Howard A. Stine. - III. Effect of variable viscosity and thermal conductivity on the high-speed plane Couette flow of a semirarified gas, by T. C. Lin. - IV. New approach to the design of metering pins in oleo struts, by H. P. Durand and R. M. Rosenberg. - V. Aileron flutter in a single degree of freedom, by K. P. Abichandani and R. M. Rosenberg. - VI. Periodic solutions of a nonlinear differential equation, by R. M. Rosenberg and A. J. Wang. - VII. Influence of axial torques on the critical speeds of uniform shafts in self-aligning bearings, by R. M. Rosenberg. - VIII. Instability problem arising in uniform cantilevered struts, by Harold C. Martin. - IX. Observation regarding the deflections of uniform swept cantilevered plates, by H. J. Gursahaney and Harold C. Martin. - X. St. Venant torsion problem for the hyperbolic airfoil cross section, by T. C. Lin and L. G. Whitehead. XI. St. Venant torsion problem for cross sections consisting of one loop of the hyperbolic limacon, by T. C. Lin and H. T. Yang.

JET-BOUNDARY CORRECTIONS FOR COMPLETE AND SEMISPAN SWEPT WINGS IN CLOSED CIRCULAR WIND TUNNELS, by James C. Sivells and Rachel M. Salmi. U. S. National Advisory Committee for Aeronautics. Sep 1951. 64p diagrs, graphs, tables Microfilm $3.00, Photostat $8.75.
PB 104974

Tables and curves are presented which give values of the jet-boundary-induced upwash velocities at the horizontal center plane of a closed circular wind tunnel and at that of a closed bipolar wind tunnel which is formed when a reflection plane is installed in a circular tunnel for testing semispan wings. The application of these induced upwash velocities to the determination of the jet-boundary corrections is also discussed. In order to facilitate the computations, simplified computing forms are presented for evaluating the corrections to the angle of attack and to the drag, pitching-moment, rolling-moment, and yawing-moment coefficients. NACA TN 2454.

METHOD OF TESTING SMOOTH WINGS FOR INITIAL SHAPE AND RESISTANCE TO DISTORTION UNDER LOAD, by J. C. King and D. H. Trollope. Gt. Brit. Ministry of Supply. Aeronautical Research Council. May 1945. 14p photos, diagrs, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.00.
PB 105219

The development of special smooth wing constructions for laminar-flow aerofoils calls for a simple testing technique to check the suitability of these new designs. In the method now used a short parallel length of wing bounded by ribs is tested under uniform bending with torsion and internal pressure superimposed when necessary. A standard specimen

and standard testing technique are described. A review of the existing instruments for measuring surface irregularities is included. Cover date is 1951. S. O. Code no. 23-2531. ARC RM 2531.

PRELIMINARY ANALYSIS OF INFORMATION REQUIRED BY PILOTS FOR INSTRUMENT FLIGHT (HUMAN ENGINEERING SYSTEM STUDIES), by A.C. Williams, Jr. Illinois. University. Dept. of Psychology. n.d. 13p Microfilm $1.75, Photostat $2.50. PB 105128

1. Flying, Instrument 2. SDC TR 71-16-1.

SDC Human engineering project 20-L-1. Contract N6-ori-71, T. O. 16, NR784-003.

RECORDING SYSTEM FOR FLIGHT TEST DATA, by P. A. Hufton, F.G.R. Cook and P. S. Saunders. Gt. Brit. Ministry of Supply. Aeronautical Research Council. 1950. 13p photos, drawings (1 fold) Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.50. PB 105158

While the existing type of automatic observer has enabled more and different data to be obtained during flight tests, it incurs a very heavy expenditure of man hours in subsequent "film-reading". This large effort results in considerable delay in terms of elapsed time before the data from a test are available which, as well as slowing down the general tempo of the work, creates difficulties in test planning and progressing. To obviate these difficulties a new recording system is proposed in which the reading of the record can be mechanised. This system leads naturally to the direct use of computing machines for the subsequent analysis which would further reduce the man hours and elapsed time involved in testing. The system proposed employs a transmission system from the instruments which enables the instrument readings to be recorded in the binary digital system. This record is subsequently transcribed in an automatic "reader" the output of which may be either in the form of tabulated results, or as punched tape suitable for direct use in a sequence controlled calculator. A prototype transmission unit has been constructed. ARC CP 44.

SELF-SYNCHRONIZING STROBOSCOPIC SCHLIEREN SYSTEM FOR THE STUDY OF UNSTEADY AIR FLOWS, by Leslie F. Lawrence, Stanley F. Schmidt, and Floyd W. Looschen. U. S. National Advisory Committee for Aeronautics. Oct 1951. 29p photos, diagrs, drawings, tables Microfilm $2.00, Photostat $3.75. PB 105419

A description and several examples of an application of a self-synchronized stroboscopic schlieren system are presented. The instrument provides for visual examination of unsteady flow phenomena occuring about aerodynamic bodies in wind tunnels. The frequency limitations of the instrument were arbitrarily selected for a particular test and may be varied by modifying electronic circuits of the system. Complete circuit diagrams are presented. NACA TN 2509.

STUDY AND DEVELOPMENT OF EQUIPMENT FOR SIMULATING BLIND FLYING: PHASE B: FIELD SURVEY, by Robert Fitzpatrick and John C. Flanagan. American Institute for Research Inc., Pittsburgh, Pa. Apr 1949. 123p tables Microfilm $5.00, Photostat $16.25. PB 105129

1. Flying, Instrument - Training devices 2. SDC 37003-1.

SDC Flight section project 6-BA. Contract N7onr-37003, Project NM-001-035.

Engines and Propellers

COMPARISON OF PUSHER AND TRACTOR PROPELLERS MOUNTED ON A WING, by J. S. Thompson, R. Smelt, B. Davison and F. Smith. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jun 1940. 18p diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.25. PB 105218

From model tests on pusher and tractor propellers mounted on a wing it is deduced that the presence of the wing reduces the efficiency of the pusher propeller and may increase the efficiency of the tractor propeller. These effects are of the same order of magnitude as the propulsive efficiency change due to forward movement of the transition point behind the tractor propeller, and should be included in any comparison of the efficiencies of the two types. The pusher propeller gives almost the same increase in maximum lift as the tractor, so there need be little difference in the take-off lift. Cover date is 1951. S. O. Code no. 23-2516. ARC RM 2516.

EXPERIMENTAL INVESTIGATION OF THE PRESSURE DISTRIBUTION ABOUT A YAWED CIRCULAR CYLINDER IN THE CRITICAL REYNOLDS NUMBER RANGE, by William J. Bursnall and Laurence K. Loftin, Jr. U. S. National Advisory Committee for Aeronautics. Sep 1951. 34p diagrs, graphs Microfilm $2.25, Photostat $5.00. PB 105142

An experimental investigation was made of the pressure distribution about a circular cylinder at various angles of yaw. The results indicate that the flow and force characteristics in the range of Reynolds number based on normal velocity component near and above the critical cannot be determined only by the component of flow normal to the cylinder axis. Localized regions of laminar separation which were present in the 0^{o} yaw case in the supercritical Reynolds number range became less distinct as the yaw angle was increased and completely disappeared for yaw angles of 45^{o} and 60^{o}. NACA TN 2463.

METHOD OF SOLVING THE DIRECT AND INVERSE PROBLEM OF SUPERSONIC FLOW ALONG ARBITRARY STREAM FILAMENTS OF REVOLUTION IN TURBOMACHINES, by Chung-Hua Wu and Eleanor L. Costilow. U. S. National Advisory Committee for Aeronautics. Sep 1951. 25p diagrs, graphs Microfilm $2.00, Photostat $3.75. PB 105134

A method is presented for the determination of the supersonic flow past arbitrary turbomachines blades along stream surfaces of revolution and for the design of these blades for a prescribed velocity or turning distribution around the blades. The shapes of the stream surfaces are arbitrary. The method takes into account the variable distance between adjacent stream surfaces. NACA TN 2492.

TURBINE POWER PLANT FOR AIRCRAFT, BY FRANZ LÖSEL. TRANSLATED by W. O. Pool. Apr 1946. 66f photos, drawings, diagrs, graphs (Text in German and English) Microfilm $3.00, Enlargement Print $8.75. PB 105423

1. Power plants, Aerodynamic - Germany 2. Engines, Turbine propeller - Germany 3. Micro NAVSHIPS A1457-46 4. Micro RTP T/3 E21T.

Accompained by interrogation of Helmit Landl and Julius Kruschik on steam turbine power plant for long-range aircraft.

Aerodynamics

AERODYNAMICS OF A SUPERSONIC RECTANGULAR WING STRIKING A SHARP EDGED GUST, by Theodore R. Goodman. Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y. Sep 1950. 30p diagrs Microfilm $2.00, Photostat $3.75. PB 105319

The method of C. S. Gardner for solving non-steady finite wing problems at supersonic speeds is briefly described. An expression for the pressure is derived in terms of the velocity potential in the transformed variables used by Gardner. Non-steady wing problems are solved, according to Gardner, by solving two three-dimensional boundary value problems. In the case of the sharp edge gust, the first problem is a symmetrical finite wing problem, and the second an antissymmetrical problem based on the solution to the first problem. Expressions are derived for the pressure in the various regions on the wing, and these are shown to be conical. Finally the pressures are integrated, and formulate given for the lift and leading edge moment as functions of time, aspect ratio and Mach number. CAL AF-723-A-1.

EXPRESSIONS FOR MEASURING THE ACCURACY OF APPROXIMATE SOLUTIONS TO COMPRESSIBLE FLOW THROUGH CASCADES OF BLADES WITH EXAMPLES OF USE, by John T. Sinnette, Jr., George R. Costello and Robert L. Cumcings. U. S. National Advisory Committee for Aeronautics. Oct 1951. 32p Microfilm $2.25, Photostat $5.00. PB 105210

Four necessary conditions for steady irrotational compressible flow through a straight cascade of blades are derived from the irrotationality condition and the conservation of mass and momentum, and these conditions are used to obtain expressions for measuring the accuracy of approximate compressible flow solutions. Application to typical compressor cascades indicated that an approximation based on linear relation between pressure and specific volume is considerably more accurate than the incompressible approximation or the Prandtl-Glauert approximation. NACA TN 2501.

GENERAL CORRELATION OF TEMPERATURE PROFILES DOWN-STREAM OF A HEATED AIR JET DIRECTED PERPENDICULARLY TO AN AIR STREAM, by Edmund E. Callaghan and Robert S. Ruggeri. U. S. National Advisory Committee for Aeronautics. Sep 1951. 37p diagr, graphs Microfilm $2.25, Photostat $5.00. PB 105204

An experimental investigation was conducted to determine the temperature profile downstream of a heated air jet directed perpendicularly to an air stream. The profiles were determined at several positions downstream of the jet as a function of jet density, free-stream density, jet velocity, jet temperature, free-stream velocity, and orifice flow coefficient. A method is presented which yields a good approximation of the temperature profile in terms of dimensionless parameters of the flow and geometric conditions. NACA TN 2466.

LAMINAR BOUNDARY LAYER ON A CIRCULAR CONE IN SUPERSONIC FLOW AT A SMALL ANGLE OF ATTACK, by Franklin K. Moore. U. S. National Advisory Committee for Aeronautics. Oct 1951. 44p diagrs, graphs, tables Microfilm $2.50, Photostat $6.25. PB 105421

The laminar boundary layer on a circular cone at angle of attack to a supersonic stream is discussed. A perturbation analysis was made to show the influence of a small angle of attack on such boundary-layer quantities as skin friction, boundary-layer thickness, viscous lift, drag, and pitching moment. NACA TN 2521.

OBOBSHCHENIE FORMULY AHUKOVSKOGO NA SLUCHAI PROFILIA V RESHETKE OBTEKAEMOI SZHIMAEMYM GAZOM PRI DOZUKOVYKH SKOROSTIAKH (GENERALIZATION OF JOUKOWSKI FORMULA TO AN AIRFOIL OF A CASCADE IN COMPRESSIBLE GAS STREAM WITH SUBSONIC VELOCITIES), by L. G. Loitsianskii. Sep 1951. 16p diagrs Microfilm $1.75, Photostat $2.50. PB 104961

It is shown that the ordinary Joukowski formula for lift force of cascade blades in incompressible flow can be applied to the case of subsonic compressible flow with sufficient accuracy, provided that the density in the formula is taken as the arithmetic mean of the densities far ahead of and behind the cascade. Translation from Prikladnaya matematika i mekhanika, v. 13, no. 2, 1949, p. 209-216. NACA TM 1304.

PROCEDURE FOR CALCULATING THE DEVELOPMENT OF TURBULENT BOUNDARY LAYERS UNDER THE INFLUENCE OF ADVERSE PRESSURE GRADIENTS, by Kennedy F. Rubert and Jerome Persh. U. S. National Advisory Committee for Aeronautics. Sep 1951. 61p diagrs Microfilm $3.00, Photostat $8.75. PB 105135

A procedure based on the kinetic-energy equation and an extended form of the momentum equation has been devised for calculating the development of turbulent boundary layers in adverse pressure gradients. Predictions, by this method, of turbulent-boundary-layer development in comparison with experimental results from several sources are presented for a number of cases of flow over flat plates and airfoils and in conical diffusers. In the range of boundary-layer flow short of separation, the agreement with experiment is, in most cases, quite satisfactory; in some instances, however, there is definite disagreement between the calculated and experimental results. It is believed, however, that good agreement has been obtained in enough instances to justify continuation of effort along the present lines, particularly with respect to improvement of the correlations and refinement of the equations. NACA TN 2478.

SKIN FRICTION OF INCOMPRESSIBLE TURBULENT BOUNDARY LAYERS UNDER ADVERSE PRESSURE GRADIENTS, by Fabio R. Goldschmied. U. S. National Advisory Committee for Aeronautics. Aug 1951. 65p graphs Microfilm $3.00, Photostat $8.75. PB 104724

Experimental data for skin friction of turbulent boundary layers under adverse pressure gradient are presented from several sources. Data obtained by momentum balance are shown to follow a trend opposite to that of data obtained by hot-wire and heat-transfer methods. A new integral energy parameter and a new momentum thickness are introduced. The momentum equation and total-head measuring techniques are discussed in relation to skin-friction computation. NACA TN 2431.

SOPROTIVLENIE RESHETKI PROFILEI V GAZOVOM POTOKE S DOKRITICHESKIMI SKOROSTIAMI (RESISTANCE OF CASCADE OF AIRFOILS IN GAS STREAM AT SUBSONIC VELOCITY), by L. G. Loitsianskii. Sep 1951. 30p diagrs Microfilm $2.00, Photostat $3.75. PB 104960

A method of computing the resistance of an airfoil in cascade in a viscous compressible gas stream with subsonic velocity is presented. An essential assumption of the method is that there is only a small degree of nonhomogeneity in the flow at the section downstream of the cascade where the trailing wakes from the individual airfoils merge. The resistance is expressed in terms of the boundary-layer properties at the trailing edge of the airfoil in cascade; these properties can be computed by any compressible boundary-layer theory or can be measured. Translation from Prikladnaya matematika i mekhanika, v. 13, no. 2, 1949. NACA TM 1303.

VERDRANGUNGSWIRKUNG DER LAMINAREN GRENZSCHICHTEN UND DRUCKWIDERSTAND (DISPLACEMENT EFFECT OF THE LAMINAR BOUNDARY LAYER AND THE PRESSURE DRAG), by H. Görtler. Oct 1951. 43p graphs, tables Microfilm $2.50, Photostat $6.25. PB 105279

The displacement effect of the boundary layer on the outer frictionless flow is discussed for both steady and unsteady flows. The analysis is restricted to cases in which the potential flow pressure distribution remains valid for the boundary-layer calculation. Formulas are given for the dependence of the pressure drag, friction drag, and total drag of circular cylinders on the time from the start of motion for cases in which the velocity varies as a power of the time. Formulas for the location and for the time for the appearance of the separation point are given for two dimensional bodies of arbitrary shape. Translated from Ingenieur-Archiv, v. 14, 1944, p. 286-305. NACA TM 1315.

ZUR TURBULENTEN REIBUNGSSCHICHT BEI DRUCKANSTIEG (ON THE TURBULENT FRICTION LAYER FOR RISING PRESSURE), by K. Wieghardt and W. Tillmann. Oct 1951. 46p graphs Microfilm $2.50, Photostat $6.25. PB 105303

Among the information presented are included displacement, momentum, and kinetic energy thicknesses, shearing stress distributions across the boundary layer, and surface friction coefficients. The Gruschwitz method and its modifications are examined and tested. An energy theorem for the turbulent boundary layer is introduced and discussed but does not lead to a method for the prediction of the behavior of the turbulent boundary layer because relations for the shearing stress and the surface friction are lacking. Translated from Zentrale für wissenschaftliches Berichtswesen der Luftfahrtforschung, Berlin. Untersuchungen und mitteilungen nr. 6617, November 20, 1944. ZWB UM 6617. NACA TM 1314.

Land Transportation

ELECTRIFICATION OF THE SWEDISH STATE RAILWAYS AND ITS SIGNIFICANCE IN TRANSPORT ECONOMICS, by Th. Thelander. 1950. 48p photos, drawings, graphs, tables Microfilm $2.50, Photostat $6.25. PB 101715

1. Railroads, Electric - Sweden 2. Transportation - Economics - Sweden 3. Sweden. State Railways Board.

Marine Transportation

SOME TESTS WITH MODELS OF SMALL VESSELS, by H. F. Nordström. Sweden. Statens Skeppsprovningsanstalt, Göteborg, Sweden. 1951. 41p diagrs, graphs, tables Microfilm $2.50, Photostat $6.25. PB 105306

1. Ship models - Tests - Sweden.

Meddelanden nr. 19. Translation of paper published in Teknisk. Tidskrift, Skeppsbyggnadskonst, 1936.

WATER SUPPLY, SANITATION AND PUBLIC HEALTH

SEWAGE PURIFICATION BY ROCK FILTERS: THE PERFORMANCE OF STANDARD-RATE TRICKLING FILTERS, by J. H. Sorrels and P.J.A. Zeller. Texas. Engineering Experiment Station, College Station, Tex. Nov 1950. 27p photos, graphs, tables Available from Texas. Engineering Experiment Station, College Station, Texas. PB 104802

1. Sewage - Purification 2. Filters, Rock 3. Sewage disposal plants - Filters 4. TU EES B123.

Bulletin of the Agricultural and Mechanical College of Texas, ser. 5, vol. 6, no. 11.

MISCELLANEOUS

AMERIKANSK OCH SVENSK JORDKLASSIFIKATION SPECIELLT FÖR VÄGAR OCH FLYGFÄLT (AMERICAN AND SWEDISH SOIL CLASSIFICATION, ESPECIALLY FOR HIGHWAYS AND AIRFIELDS), by Gunnar Beskow. Chalmers University of Technology, Gothenburg, Sweden. 1951. 47p graphs, tables (Text in Swedish) Microfilm $2.50, Photostat $6.00. PB 104718

1. Soils - Classification - Sweden 2. Chalmers University of Technology, Gothenburg, Sweden. Transactions nr. 111.

Summary in English.

NOTICE TO SUBSCRIBERS

The "PB" reports are one of the world's largest collections of nonconfidential technical information. There are now close to 150,000 reports in this series.

Many of these reports are extremely specialized, and therefore have not been in sufficient demand to warrant publication in customary form. Instead, the original document is deposited at the Library of Congress.

If you live in Washington, or visit the city, you may inspect the original document without charge at the Library of Congress Annex Reading Room. Otherwise you may purchase a copy from the Library in either photostat or microfilm form. Microfilm requires the use of a special reading machine. If you do not have such a machine, you may be able to use one at a library in your area.

Unfortunately, not all documents photograph very well. When it is known that copies will be difficult to read, a warning note to this effect appears in the Bibliography of TECHNICAL REPORTS. O. T. S. cannot, however, guarantee the legibility of any report—and the Library of Congress will furnish a replacement only if the quality of the photo copy is below the standard obtainable on their equipment.

Please note that not all PB reports must be purchased in photostat or microfilm form. It has been possible to furnish mimeographed or printed copies of the most important technical reports where the demand warrants the making of such copies. These reports may be purchased directly from O. T. S. (see notice on "How To Order an O. T. S. Report"—front cover) and are available from stock.

Since 1945 thousands of U. S. firms have used "PB" reports with interest and profit. Your inspection of these materials is cordially invited. Please write to us if we can be of service.